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CITY OF ABERDEEN.

REPORT

BY THE

MEDICAL OFFICER OF HEALTH

(MATTHEW HAY, M.D., LL.D.)

FOR THE YEAR

1909.

With Appendix on Tuberculosis in Aberdeen.



CITY OF ABERDEEN.

REPORT BY THE MEDICAL OFFICER OF HEALTH

For the Year 1909.

POPULATION.

(Table I.)

As estimated by the Registrar-General from the census of 1901 and the previous census of 1891, the population of the city, at the middle of 1909, was 181,918. The population in the preceding year was similarly estimated at 178,210. The increase, according to this estimate, amounts to 3,708. As stated, however, in recent annual reports, it is certain that the rate of growth of the population is considerably below that estimated by the Registrar-General. Estimated from the increase in the Voters' Roll and in inhabited houses, the population probably did not exceed 168,000 at the middle of 1909, which gives an increase for the year of only 900, as compared with the 3,708 of the Registrar-General. There does not yet appear to be much relief from the industrial depression which has affected Aberdeen, in common with practically the whole country, for the past four years. As affording some indication of the diminished growth of the city, it may be stated that, for the first time for many years, the valuation showed a decrease of £4,652, in place of the usual annual increase—an increase which so recently as 1905 amounted to upwards of £30,000.

I would wish again to state that recent experience has greatly strengthened the demand for a quinquennial in place of a decennial census, or at least for such a supplementary enumeration of the population at the middle of the present intercensal period as would give the principal figures for the administrative units of the kingdom. The absence of such an enumeration was greatly felt during the Inquiry before the House of Lords Committee in the promotion of the Bill for providing the city with a new water supply. The approaching census will, however, supply us with reliable data for a time.

In order to avoid discrepancy with the rates as published by the Registrar-General, the rates for births, marriages, and deaths in the tables accompanying this report are calculated on the population estimated by him. This means that the rates given are probably lower than the actual rates by about 8.2 per cent. Thus, the total death-rate for the year, instead of being 14.7, was probably about 15.9; and the birth-rate, instead of being 24.8, was probably about 26.8; while the marriage-rate was probably about 8.0, instead of 7.4.

BIRTH-RATE.

(Table II.)

The total number of births registered during the year, inclusive of 27 births in the City Poorhouse at Oldmill, which is outside the city boundary, was 4,518, or at the rate of 24.8 per 1,000 of the population, as estimated by the Registrar-General.

TABLE I.—POPULATION OF ABERDEEN IN 1909
At Various Age-Periods.
(As estimated from Census.)

	Under 1 year.	0—5 years.	5—15 years.	15—25 years.	25—60 years.	Above 60 years.	All Ages.
Percentages of Population at each Age (according to Census)	2·71	12·43	21·61	20·58	37·83	7·55	...
Estimated Population at each Age-Period in 1909	4,930	22,612	39,312	37,439	68,820	13,735	181,918

TABLE II.—BIRTH, DEATH, AND MARRIAGE RATES IN ABERDEEN
Per 1,000 of Population.

Year.	Births.			Deaths.			Marriages.		
	St. Nicholas.	St. Machar.	City.	St. Nicholas.	St. Machar.	City.	St. Nicholas.	St. Machar.	City.
1909 . . .	29·7	21·6	24·8	17·9	12·6	14·7	10·6	5·3	7·4
1908 . . .	29·1	22·4	25·1	17·1	12·8	14·5	10·7	5·1	7·3
1907 . . .	30·4	22·7	25·8	17·2	12·2	14·2	12·9	5·5	8·4
1906 . . .	31·8	24·7	27·6	16·7	13·2	14·6	12·3	5·0	7·9
1905 . . .	35·0	25·4	29·2	19·0	13·4	15·6	12·6	5·3	8·2
1904 . . .	34·2	26·8	29·8	20·6	15·0	17·2	14·0	5·9	9·2
Mean of 1904-1908 }	32·1	24·4	27·5	18·1	13·3	15·2	12·5	5·4	8·2
1903 . . .	35·9	27·7	31·0	21·1	14·4	17·0	14·2	5·6	9·1
1902 . . .	35·4	27·2	30·5	22·1	15·1	17·9	14·1	5·7	9·1
1901 . . .	37·0	27·0	31·0	21·6	16·0	18·2	13·3	5·9	8·9
1900 . . .	37·8	27·9	31·8	23·7	15·9	19·0	14·0	5·6	9·0
1899 . . .	38·0	27·7	31·9	22·6	15·5	18·4	13·9	6·7	9·6
Mean of 1899-1903 }	36·8	27·5	31·2	22·2	15·4	18·1	13·9	5·9	9·1
1886-95 . . .	35·4	29·5	32·2	22·7	17·4	20·0	11·1	5·7	8·1
1876-85 . . .	...	...	34·4	...	...	20·4	...	...	7·8
1866-75 . . .	...	...	36·2	...	...	23·0	...	...	8·2

In the preceding year (1908) the births amounted to 4,472, or at the rate of 25.1 per 1,000 of the population, and in 1907 to 4,518, or at the rate of 25.8. The birth-rate has fallen considerably in recent years, even when allowance is made for its being estimated on too high a population; but there are indications that the rapidity of the fall is now being lessened. During the last two years the decline has been much less than it was in the immediately preceding five years. Aberdeen is not singular in its rapidly declining birth-rate; almost every large town is showing a similar fall. It is also apparent in continental countries as well as in our own, and in none more than in France, where the death-rate is now actually in excess of the birth-rate.

The proportion of males to females born during the year was as 102 : 100. In the preceding year it was as 104 : 100; while in 1907 it was 113 : 100. The last was, however, exceptionally high. The rapid fall in the proportion of male births is interesting.

The percentage of illegitimate births to the total births in Aberdeen during the year was 9.2, or the same as the preceding year (1908). The average for the ten years preceding 1908 was, however, only 8.3. As compared with most large towns, Aberdeen has a high proportion of illegitimate births.

It is worthy of observation that, whatever be the cause, there has been in the large Scottish towns, as a whole, a tendency towards an increase of the proportion of illegitimate births since about 1903. Previously the proportion had been gradually declining. Probably the recent fall in the marriage-rate has been the main cause of the increased illegitimacy.

MARRIAGE-RATE.

(Table II.)

During the year there were 1,347 marriages within the city, equivalent to a rate of 7.4 per 1,000 of population. In the preceding year there were 1,297 marriages, and in 1907 there were 1,473 marriages.

The marriage-rate, even when corrected for the probable error in population, is one of the lowest recorded for many years, although not quite so low as that for the preceding year.

Relation of birth-rate to marriage-rate.—The average number of births to each marriage since 1866 in the three decennial periods up to 1895, and in the succeeding two quinquennial periods, shows that marriages since 1866 have become gradually less fertile.

Period.	Average Number of Births to each Marriage.
1866-1875 (Ten Years)	4.4
1876-1885 (Ten Years)	4.4
1886-1895 (Ten Years)	4.0
1899-1903 (Five Years)	3.4
1904-1908 (Five Years)	3.3

These figures include the illegitimate births, but their subtraction would not materially influence the apparent decline in fertility.

DEATH-RATE.

(Table II.)

The total number of deaths during the year was 2,675, equivalent to a death-rate of 14.7 per 1,000 of the population, as estimated by the Registrar-General. In the preceding year the deaths amounted to 2,582, giving a death-rate of 14.5. These death-rates, it is important to note, have been obtained after adjusting the list of deaths by the interchange between this and other districts of deaths of persons occurring in districts outside their usual place of residence.

This adjustment is now the more necessary since in the case of many towns, as Aberdeen itself, institutions like the City Poorhouse and City Asylum are situated outside the boundary of the town. It is desirable that the Registrar-General should arrange for the registration of such institutions being added to those of the town to which the institutions belong, and the approach of the new census might provide an opportunity for the Registrar-General, if petitioned by the Town Council, making the desired arrangement.

Allowing for the death-rate during the past year being unduly lowered by an over-estimation of the population—an allowance which must be made for the rate for each year since 1904—the rate is low when compared with the rate for any year preceding 1905. It is, however, higher than the rates for 1906 to 1908. During the past three years there has been a slow increase of the death-rate, which I ventured in previous reports to predict as likely to occur in view of diminished employment and consequent distress and under-feeding among certain classes in the city. It is rather a matter for surprise that the increase is not greater. The decrease in the valuation of the city, already referred to, is evidence of the almost complete paralysis of the building trades, by which so many workmen make their living.

It is a little consolatory to know that Aberdeen is suffering in common with nearly every large town in Scotland, and that the causes are general and not local, and are, therefore, almost certain to pass away with the return of the general tide of prosperity which is never absent, although sometimes provokingly delayed, after the full ebb of depression has been reached.

As will be stated more fully later, the death-rate for Aberdeen, although showing an inclination to increase, was under the rate for the six other large towns of Scotland.

Relative decline in birth-rate and death-rate.—Apart from emigration and immigration, the growth of a population depends on the excess of births over deaths. I took occasion last year to point out that, in Aberdeen, this excess, in spite of a rapidly declining birth-rate, had not undergone any substantial diminution until lately, owing to the death-rate having undergone a corresponding decline. Throughout the period 1866 to 1903, the excess was about 13.1 per 1,000 of the population per annum. In 1907 it fell to 12.2, and in 1908 to 11.2. Last year it was 10.9. It is not likely that for some years we shall find the excess of births over deaths showing any tendency to regain its former level. It depends on whether the decline in the birth-rate is now coming to an end, and whether the death-rate is likely, with renewed industrial prosperity, to begin again to diminish. But the fall of the death-rate has its limits.

TABLE III.—MORTALITY FROM ALL CAUSES AT VARIOUS AGE-PERIODS
(per 1,000 of population at each age).

Year.	INFANTILE MORTALITY.	AGE-PERIOD.					All Ages.
	Deaths of Infants under 1 year, per 1,000 births.	0—5 Years. (Infant Period.)	5—15 years. (School Period.)	15—25 years. (Adolescent Period.)	25—60 years. (Mature Period.)	60 years and upwards. (Post-mature Period.)	
1909 . . .	149	41·8	2·7	3·2	9·5	62·0	14·7
1908 . . .	129	37·8	2·8	3·2	10·0	63·3	14·5
1907 . . .	125	38·2	2·5	2·9	9·8	58·9	14·2
1906 . . .	127	41·4	2·4	3·4	9·9	57·8	14·6
1905 . . .	138	44·0	2·8	3·7	10·6	61·6	15·6
1904 . . .	151	54·7	3·0	3·5	11·1	62·9	17·2
Mean of 1904-1908 (Five years.)	134	43·2	2·7	3·3	10·3	60·9	15·2
1903 . . .	135	49·7	2·8	4·6	11·8	62·7	17·0
1902 . . .	137	48·4	2·8	5·2	12·8	69·4	17·9
1901 . . .	152	52·2	3·4	5·1	12·4	68·3	18·2
1900 . . .	149	54·4	3·0	4·9	14·0	68·9	19·0
1899 . . .	144	55·0	2·9	5·6	12·6	64·7	18·4
Mean of 1899-1903 (Five years.)	143	51·9	3·0	5·1	12·7	66·8	18·1
1886-95 . . . (Ten years.)	143	53·8	4·6	6·3	12·8	68·1	20·0
1876-85 . . .	128	52·0	5·7	6·9	13·5	69·9	20·4
1866-75 . . .	133	59·4	7·4	6·0	18·7	72·3	23·0

ANALYSIS OF THE DEATH-RATE.

(a) Mortality in relation to Age (Tables III., IV., and V.).

Infantile Mortality.—The report for each of the preceding two years was supplemented by a special report of the results of an inquiry into infantile mortality in Aberdeen. It is disappointing that, in spite of the large amount of attention given to this highly important subject, and of the most efficient services of the Health Visitors of the Corporation, aided by the earnest and devoted labours of voluntary workers, the deaths among infants under one year rose to 149 per 1,000 births, from 125 and 129 in the years 1907 and 1908 respectively.

In 1909 there were 671 infant deaths, as against 577 in the preceding year, or an increase of nearly 100. Practically the whole increase was among children dying under one month old. More than half of the increase took place in the last two months of 1909, when the mortality among infants rose with almost startling rapidity, so that in December the deaths were nearly twice as numerous as in the corresponding month of 1908.

In the first two quarters of the year there was also an increase, chiefly in the months of February to May. In the summer and autumn months there was a decline rather than an increase, as compared with the preceding year.

The increase in the early part of the year was chiefly due to an epidemic of whooping cough, which, as usual, exacted a heavy toll among infants, who have always much difficulty in recovering from an attack of this disease. Along with the considerable increase of deaths from whooping cough there was a high mortality from pneumonia, which may in part have been dependent on the occurrence of whooping cough.

The large increase of infantile mortality in December was mainly caused by an exceptional number of deaths from bronchitis and pneumonia and from prematurity. From prematurity there were 15 deaths, as against 4 in the corresponding month of 1908; from bronchitis there were 18, as against 3; and from pneumonia and broncho-pneumonia there were 13, as against 6. Diseases of the digestive system accounted for only 5 deaths, and were not above the average. Many of the deaths, especially those from prematurity, occurred within the first week of life. Thus, there were 16 deaths at this early age, as against 3 in December, 1908. I made a special inquiry into the circumstances of each death from prematurity and lung diseases. No common cause for the excessive number of premature births was discoverable; but 6 cases of premature birth, in which the child subsequently died, were attributed to a slip on the icy pavement during the sharp spells of frost in November and December. Other 6 occurred among women who had suffered from previous miscarriages, 2 were due to fright or shock, and 2 were attributed to influenza and bronchitis. As regards the deaths from bronchitis and pneumonia, they may have been associated with the cold and very changeable character of the weather. They were not due to any excess of measles or whooping cough. It is interesting to note that in many of the cases the baby seems to have been infected from colds in the mother or other members of the family. In 2 of the deaths from pneumonia there had been an antecedent case of pneumonia in a brother or sister. In a few cases the family were in great poverty; and the lack of sufficient food, along with the want of fuel for heating, rendered the baby, no doubt, more liable to suffer from the cold weather. The deaths were about

equally divided among breast-fed children and bottle-fed children; and were chiefly confined to families occupying houses of one and two rooms.

It may be noted that during the same month there was a similarly great increase in infantile deaths in Glasgow, which appears also to have been largely caused by bronchitis and pneumonia; but the Medical Officer informed me, on inquiry, that the deaths from prematurity were under the average. In Edinburgh and Dundee there was no such marked increase in the infantile mortality as in Aberdeen and Glasgow.

In the succeeding month of January the excessive mortality from lung diseases had disappeared.

The comparatively low infantile mortality in the summer and autumn months leads to the expectation that an increased death-rate from diarrhœal diseases and other diseases of the digestive system played no part in the general increase for the year. Reference to Table V. shows that the deaths from such diseases were considerably under the average. They were even fewer than in the immediately preceding year.

The somewhat depressing record of infantile mortality for 1909 is, it is satisfactory to know, being followed by a year of low mortality in 1910.

The work of the three Health Visitors of the Corporation continues to be carried on with much intelligence, and, in spite of the high infantile mortality for last year, with visible benefit to mothers and babies. Besides inspecting a large number of houses for uncleanness, they visited the homes of 2,893 infants, out of the 4,491 born within the city. These visits were, as usual, mostly confined to the smaller houses—that is, houses of one to three rooms. About three-fourths of all the births in such houses were visited. The infants visited were distributed as follows over the registration districts of the city:—

SIZE OF HOUSE.	St. Nicholas.	St. Machar (including E. Peterculter).	Nigg (Torry).	Woodside.	Old Aberdeen.	Total.	Breast-fed.	Hand-fed.	Percentage of Breast-fed in total Infants Visited.
1-Roomed . .	285	64	11	9	1	370	345	25	93
2-Roomed . .	904	540	219	110	26	1,799	1,511	288	84
3-Roomed . .	266	188	91	48	13	606	445	161	73
4-Roomed and upwards	62	36	8	8	4	118	91	27	77
ALL HOUSES .	1,517	828	329	175	44	2,893	2,392	501	83

The proportion of breast-fed infants was, as usual, found to be highest in the smallest houses and among the poorest families; and it is gratifying to know that, apparently as the result of enlarged interest recently in the proper feeding of infants, the proportion of breast-fed infants is showing a large increase among all classes in the city.

The work of the Health Visitors among infants is greatly appreciated by mothers, and constitutes, in my opinion, one of the most valuable branches of the work of the Health Department. Like all educative work, especially among grown-

ups, it must produce its effect slowly, but I entertain no doubt as to its great ultimate value, not merely in regard to the care of infants, but as concerns the whole sphere of domestic hygiene—a sphere in which the main part of future progress in the public health must be looked for.

It would be ungenerous not to refer, in this connection, to the wholly admirable assistance being given to the Health Visitors by the ladies of the Mothers' and Babies' Club. The value of their co-operation lies not only in the personal assistance which they so unselfishly render, but also in the stimulus and interest which their presence and sympathy give to the whole work. The club, which began in the autumn of 1909 by meeting with mothers and babies in the club rooms once a week, has recently found it desirable to arrange for two meetings weekly, partly to lessen the crowding, and partly to enable mothers of first infants to be separated from other mothers, with a view to their receiving special instruction.

Plain lectures or talks on the care of babies, and on their feeding, are given at the meetings, and are followed with evident interest and appreciation by the mothers, many of whom are for the time relieved of the care of their babies by the ladies, who look after them in an adjoining room. Every lecture is accompanied, as far as possible, by practical demonstrations. The Health Visitors give many of the lectures, and have been admirably aided by Mrs. Livingstone, who undertakes the lectures on cooking. By the generosity of friends of the club, milk is supplied to both mothers and bottle-fed babies in necessitous cases. Much attention is also given to the proper clothing of babies, and to the making of such clothing. In a few cases clothing is provided for babies.

In the course of the year, in order to increase interest in the work and the objects of the club, a public meeting was held in the Town Hall, and was addressed by Mrs. Maxwell and Mrs. Somerville, of Edinburgh: the Convener of the Public Health Committee, Councillor Kendall Burnett, occupied the chair. It was hoped that, as the result of this meeting, which was unusually well attended, and which awakened much interest, there would be a large accession to the number of voluntary workers. There has been a considerable addition, but there is ample scope for the services of a still greater number.

It is desirable that branch clubs should be formed in all the poorer parts of the city, with rooms in a convenient situation for the attendance of mothers who cannot be expected to come to one central place. With this in view, and for the purpose of obtaining a larger number of voluntary visitors, I recently addressed a letter to each clergyman in the city. The letter was followed by a deputation from the Ladies' Committee of the club, and there is some promise of a satisfactory response.

It is, perhaps, invidious to refer specially to the services of any member of the Ladies' Committee, where all have worked so well, but I think every member of the committee will allow that the success and enthusiasm of the club owes much to the devotion of the convener, Mrs. G. B. Esslemont, and to the services of the secretaries, Miss Macmillan, senior Health Visitor of the Health Department of the city, and Miss Croll.

It may be remembered that one of the deductions from the special inquiry on infantile mortality reported upon last year, was that while bottle-feeding did not appear to be attended by any very obviously injurious results in families of the higher classes, it was accompanied among families of the poorer classes by an infantile

mortality about twice as high as that met with among breast-fed infants. This excessive mortality is probably in large measure due to the germ impurity of the milk as given to infants in many of the poorer houses. In order to encourage sterilisation of the milk in such cases, I obtained the sanction of the Public Health Committee to the gratuitous supply or loan of a simple steriliser which I devised for the purpose. The steriliser is accompanied by full and plain directions as to its use. A considerable number of the poorer mothers have taken advantage of the offer of the Committee. The sterilisers were not issued until about the close of the year, so that any beneficial effect they may have exerted could scarcely be apparent before the present year.

The Notification of Births Act was adopted by the Town Council in the course of the year, and came into force on 1st June. In order to cope with the additional work, the Council appointed a third Health Visitor.

The Act has worked with great smoothness and with remarkable completeness. The omissions to notify are checked by weekly returns of births from the registrars, and a notice is at once sent to the father of any baby whose birth has not been notified. A print of the requirements of the Act is enclosed, and attention is directed to the penalty incurred by failure to notify. The result is that the father hastens to explain his failure, which is nearly always attributed to ignorance of the Act, and to the absence of any hint from the medical attendant or midwife. He usually sees the doctor or midwife, to complain of the difficulty in which he has been placed, and the doctor and midwife are thus stimulated to remind the parent at the next birth, if they do not themselves send the notification. We have now relatively few failures to notify—scarcely 5 per cent. The advantage of the Act is considerable, in enabling the Health Visitors to get sooner into touch with the mother and baby in such cases as they feel called upon to visit. No visit is made to any case if the medical attendant intimates in his letter of notification that a visit is not required. The notification form supplied to medical men is so worded as to facilitate the expression of their wish in this matter.

Mortality at "School" Age-Period (5-15 years).—The mortality at this age-period (2.7 per 1,000 of population at the particular age), although slightly less than in the preceding year, when it was 2.8, is a little higher than it was in 1906 and 1907, and is exactly equal to the average for the past five years. It is only slightly more than one-third of the average rate in 1866-1875, and, accordingly, shows a remarkable decline.

I have made reference in recent reports to the prospect of the School Board arranging for the systematic medical inspection of the children under its care. I am glad to be able to report that shortly after the close of the year under review, the Board appointed as their medical officer Dr. Rose, who has been medical adviser to the Board for several years, and has had, as one of the surgeons of the Royal Hospital for Sick Children, a large experience of the diseases of children. He is now to devote the whole of his time to the work of the Board.

The question of dealing with the lack of cleanliness among children, and especially with the presence of body vermin, has been taken up vigorously by the medical officer of the Board and by the Board itself. It may be recollected that I dwelt at some length on this important matter in my report for the preceding year. The recent Children Act confers considerable powers on the School Board for the cleans-

ing of children. The Board is now in course of arranging with the Local Authority for the cleansing being carried out at the disinfecting station belonging to the Local Authority. The proposal is that the Board and the Town Council should share equally in the expense of the cleansing, and that, in order to make the cleansing thorough in such cases as appear to require drastic measures, the whole household should be dealt with. All the members of the family are to be removed to the disinfecting station to have their clothes disinfected and their bodies washed; and at the same time the house is to be fumigated and cleaned, and all bedding and clothing are to be removed for disinfection by steam. The work proposed is largely experimental. If it is found, after a full trial, to be impracticable or ineffective, especially in so far as it concerns complete households, its range will be narrowed to dealing with the children alone. We have already, without any agreement, been undertaking in a limited way such cleansing work for the School Board, and it is plain that the standard of cleanliness in some families is, unhappily, very low. Whether such families can be made to practise greater cleanliness in the future, after the application of thorough measures by the public authorities, remains to be seen, but it is sincerely hoped that some good will follow in the majority of cases from the proposed work.

I desire to repeat the plea that I have put forward for several years in my annual report for a more ample provision of play and recreation grounds for children. Recently an admirable playground has been created for children within the cleared area between the Gallowgate and Seamount Place. This will be a great boon to the numerous poor children in the neighbourhood; but it is only one of several districts in which a similar playground could, as opportunity offers, be provided, with great advantage to the health of the children.

As stated in a previous report, it is absolutely certain that in all progressive communities the policy governing town extension in the near future will embrace the provision of ample space for public parks and playgrounds in convenient positions. The capital expended on them—as on every other measure for promoting health—is not unprofitably invested even from a purely financial standpoint, if it helps to keep the children, and, indeed, the population as a whole, more healthy, and thereby reduces the heavy expenditure and loss which sickness nearly always entails.

It is gratifying to find that the two schemes for taking ailing children to the country for two to three weeks during the summer continue to be generously supported by the citizens of Aberdeen. There are few charitable agencies connected with the city that do more good, or carry out their work so cheaply, in proportion to the benefit done. The pleasure given to the poor children is alone worth the whole expenditure, and the advantage in health is real and substantial. During the year 635 children enjoyed the benefit of one or other of the two schemes. Each scheme has now associated with it a home in the country for the reception of the children. The Children's Fresh-Air Fortnight Committee has erected a home at Linnmoor, near Culter, capable of accommodating 100 children. It has a large moor attached to it, on which the children have complete freedom in romping about. The Aberdeen Camp for Ailing Children has a home on Scotston Moor, capable of accommodating 90 children.

The improvement in the health of the children after their stay in the country and their constant life in the open air is often quite remarkable, and cannot fail to

be of great assistance in carrying many of them through the succeeding winter without serious illness. Children are peculiarly susceptible to the influences of a healthy environment, and shake off ill-health more quickly than grown-up persons. During the 21 years of its existence, the Children's Fresh-Air Fortnight has only in one year sent fewer than 300 children to the country, and over the whole period has sent an average of fully 400 yearly, or, altogether, upwards of 8,600. The Scotston Moor Camp has been established for only five years, and has sent out on an average 139 yearly, or, altogether, 696. The number for 1909 was 217.

Great advantage also accrues to many poor children from the feeding provided for them during the winter months, formerly, by the Educational Trust, and now by the School Board, from funds previously in charge of the Trust. This has also been largely supplemented by voluntary subscriptions, so that altogether nearly 800 children are in daily receipt of food from these sources during the winter months. If a stay in the country and fresh air help to dissipate illness, under-feeding equally helps in engendering it.

Mortality at "Adolescent" Period (15-25 years).—The death-rate at this period during the year (3.2 per 1,000) stands at the same figure as it did in the preceding year, and is slightly under the average for the previous five years. This is the age-period during which insanitary influences connected with occupation are most active. It is especially important for persons of the "adolescent" period that the offices and workshops in which they carry on their duties should be spacious and well ventilated, and that the hours of labour should not be too protracted, or the labour itself too severe and wearing. This is a period in which the seeds of consumption often take root if the conditions of occupation imply over-strain or much confinement. An ever-increasing number of the youths of both sexes are now engaged in occupations of a more or less sedentary kind, and it is important in the interests of their health that employers should be liberal in the granting of holidays. It is equally important that the young persons themselves should utilise these holidays and their spare hours in living as much as possible in the open air, and in taking a reasonable amount of exercise. A healthy adolescence offers the best assurance of a healthy manhood and womanhood.

With a view to increasing the amount of time available for out-door recreation, especially for such persons as are engaged in sedentary occupations, I would repeat the suggestion that I have previously made that the hours of offices and of such workshops as those of milliners and dressmakers should be so arranged in the summer months that the work would begin an hour sooner and finish an hour earlier. In this way, a longer evening would be provided for recreation, and the gain in health, and, consequently, in fitness for work, would be considerable.

Mortality at "Mature" Age-Period (25 to 60 years).—The death-rate at this period (9.5 per 1,000) is the lowest on record, and is now only about a half of the corresponding rate in 1866-1875.

The scheme of invalidity insurance which, it is understood, the Government are going to submit to Parliament at an early date, will be of great help to workmen of this age-period. Such a system of insurance will enable the bread-winner of a family when he falls ill to remain off duty until he has entirely recovered, without having anxiety as to the maintenance of his family. The too-early return of a workman to duty after illness is a frequent source of serious complications that may

TABLE IV.—MORTALITY AT VARIOUS AGE-PERIODS FROM VARIOUS CAUSES.

(Corrected for transferred deaths—see page 6.)

AGE.	ALL CAUSES.	Zymotic Diseases.			Tubercular Diseases.		Respiratory Diseases.			Circulatory Diseases.			Dis. of Urinary System.	Nervous Diseases.		Dis. of Digest. Syst. incl. Diarrhoea.	Malignant Diseases.	Developmental Diseases (ex. old age Accident and Violence.	Debility, Atrophy, Inanition.		Miscellaneous.
		Miasmatic.	Veneral.	Septic.	Phthisis.	Other Tubercular.	Pneumonia.	Bronchitis.	Other Respiratory.	Cerebral Hemorrhage & Hemiplegia.	Other Circulatory.	Convulsions.		Other Nervous.	Under age of 1 year.				Above age of 60 years.		
A.—NUMBER OF DEATHS—YEAR 1909.																					
Under 1 year,	671	72	15	3	0	22	72	61	6	3	0	2	49	16	88	0	171	8	58	...	25
Under 5 years,	944	177	19	4	12	49	109	73	9	7	1	3	61	28	105	0	172	19	58	...	38
5—15 „	107	28	0	1	11	19	8	0	0	0	5	0	1	10	7	0	1	8	...	...	8
15—25 „	120	6	0	2	35	8	6	1	1	1	11	3	0	7	13	2	0	10	...	...	14
25—60 „	652	11	2	17	114	12	50	18	15	46	105	32	0	40	30	81	0	32	...	...	47
60+ „	852	13	0	4	9	1	50	89	8	125	223	33	0	27	44	99	0	11	...	93	23
ALL AGES, .	2675	235	21	28	181	89	223	181	33	179	345	71	62	112	199	182	173	80	58	93	130
B.—DEATHS PER 100,000 OF POPULATION AT EACH AGE—YEAR 1909.																					
Under 1 year,	13,611	1460	304	61	0	446	1460	1237	124	61	0	41	994	325	1785	0	3469	162	1176	...	507
Under 5 years,	4175	783	84	18	53	217	482	323	40	31	4	13	270	124	464	0	761	84	...	...	168
5—15 „	272	71	0	3	28	48	20	0	0	0	13	0	3	25	17	0	3	20	...	...	20
15—25 „	321	16	0	5	93	21	16	3	3	3	29	8	0	19	35	5	0	27	...	...	37
25—60 „	947	16	3	25	166	17	72	26	21	67	153	46	0	58	44	118	0	46	...	...	68
60+ „	6203	94	0	29	66	7	364	648	58	910	1624	240	0	197	320	721	0	80	...	677	167
ALL AGES, .	1470	129	12	15	99	49	123	99	18	98	190	39	34	62	109	100	95	44	...	...	71
C.—DEATHS PER 100,000 OF POPULATION AT EACH AGE—AVERAGE FOR TEN YEARS—1899-1908.																					
Under 1 year,	15,348	1562	277	79	44	526	1199	1545	161	44	166	35	1176	415	2684	0	3513	247	1243	...	599
Under 5 years,	4778	830	65	20	34	313	482	437	65	13	42	13	301	161	703	1.7	767	110	...	...	196
5—15 „	285	37	0.5	3.4	39	61	16	4.6	2.7	1.1	21	7	2.7	16	27	2.0	0.6	21	...	...	22
15—25 „	422	20	0	10	176	34	26	2.9	6.2	1.5	32	10	0.6	18	28	3.6	0.3	18	...	...	32
25—60 „	1153	30	3.6	26	207	24	92	50	2.4	62	178	45	0.5	70	72	119	0.2	66	...	...	87
60+ „	6412	171	6.1	52	86	8	328	771	107	787	1503	297	3.1	206	382	599	0	133	...	713	260
ALL AGES, .	1673	139	9.9	19	131	69	128	136	27	88	202	45	38	69	155	93	94	56	...	...	88

lead to permanent injury of health, and to a shortened life. Invalidity insurance will be of particular benefit to workmen suffering from incipient phthisis, by enabling them to make the necessary stay in a sanatorium or hospital to effect an arrest of the disease. Unfortunately, very few workmen are in a position, when overtaken by phthisis, to provide for their families during a prolonged period, and they accordingly keep at their work until their illness has reached a stage when a cure is almost impossible.

*Mortality at "Post-Mature" Age-Period (60 years and upwards).—*The death-rate at this age-period (62.0 per 1,000) is lower than in the preceding year (63.3), but somewhat higher than the average for the previous five years (60.9).

Men of this age-period will benefit equally with those of the "mature" period from invalidity insurance, although it is less necessary, in so far as phthisis is concerned, owing to the deaths from phthisis at this age-period being comparatively few. The old-age pensions, recently granted by Parliament, ought to have some effect in reducing the death-rate of the population generally, inasmuch as they should not only assist in prolonging the lives of those to whom they are granted, but may also, by relieving married sons and daughters, in part or in whole, of the contributions that many have hitherto been obliged to make towards the maintenance of aged parents, increase the means of living among the poorer classes generally.

(b) Mortality in relation to Cause.

Tables IV., V., and VI. give details of this for the year, and afford also material for a comparison with previous years.

The chief causes of death at all ages during the year were, in the order of their numerical importance: diseases of the circulatory system, with 524 deaths, or 20 per cent. of the total deaths from all causes; diseases of the respiratory system, with 437 deaths, or 16 per cent.; tuberculous diseases, with 270 deaths, or 10 per cent.; miasmatic diseases, with 235 deaths, or 9 per cent.; diseases of the digestive system, including diarrhoea, with 199 deaths, or 7 per cent.; malignant diseases (chiefly cancer), with 182 deaths, or 7 per cent.; nervous diseases, with 174 deaths, or 6 per cent.; and developmental diseases, with 173 deaths, or also 6 per cent. of the total deaths. Then follow diseases of the urinary system, with 71 deaths, or 3 per cent. of the total deaths; septic diseases, with 28 deaths; and venereal diseases, with 21 deaths. In 80 cases, or 20 fewer than last year, death was assigned to accident or violence; and in 151 cases to debility or atrophy, of which 58 were among children under one year of age, and 93 were among persons of 60 years of age and upwards.

The causes of death were, as usual, very unequally distributed over the various age-periods (Table IV.).

Among children under 5 years of age ("infant" age-period), the principal causes of death were diseases of the respiratory system, with 191 deaths; and miasmatic (infectious) diseases, with 177 deaths. Tuberculous diseases accounted for 61 deaths, as against 54 in 1908, and 79 in 1907. In 19 cases, or 8 fewer than in the preceding year, death was ascribed to accident, 7 being caused by burns or scalds.

At the "school" age-period, in spite of a high prevalence of the commoner zymotic or miasmatic diseases, the most frequent cause of death during the past year was tuberculous disease, with 30 deaths. The next most important cause of death

TABLE V.—CAUSES OF DEATH AMONG CHILDREN—YEAR 1909.
(Corrected for transferred deaths—see page 6.)

CAUSES OF DEATH.	AGE.													Average for Preceding 5 Years.	
	WEEKS.				MONTHS.				YEARS.						Total.
	0-1	-2	-3	-4	*0-3	-6	-9	-12	*0-1	-2	-3	-4	-5		
Prematurity	81	16	11	4	124	2	...	...	126	...	...	...	...	110	110
Congenital Defects	34	6	3	1	45	1	...	...	46	...	...	...	...	27	28
Teething . . . . .	...	...	...	...	...	...	...	...	4	...	...	...	...	6	6
Wasting and Debility	3	9	4	4	32	14	7	3	56	...	...	...	...	78	78
Convulsions	6	2	3	1	28	10	6	5	49	...	...	...	...	43	52
Inflammation of Brain and Membranes . . . . .	...	1	2	...	3	3	4	5	15	2	4	1	2	24	23
Pneumonia . . . . .	...	1	1	...	17	17	21	17	72	20	12	4	1	54	104
Bronchitis . . . . .	...	5	5	2	33	13	10	5	61	8	4	...	...	73	69
Diseases of Circulation . . . . .	...	...	...	...	...	...	...	...	...	1	...	...	...	9	11
Urinary Diseases . . . . .	...	...	...	1	1	1	...	...	2	1	...	...	...	2	2
Diseases of Digestive System, incl. Diarrhoea . . . . .	...	5	1	9	40	22	17	6	85	10	3	1	1	97	119
Tuberculosis of { (a) Brain (b) Abdomen (c) Lungs (d) Other forms . . . . .	...	...	...	...	...	2	4	4	10	5	3	3	1	22	34
	...	...	...	...	...	2	1	2	7	5	2	2	1	17	21
	...	...	...	...	...	...	1	1	1	3	3	5	...	12	2
	...	...	...	...	...	1	2	1	4	2	1	1	2	2	8
Measles . . . . .	...	...	...	...	...	...	...	...	...	15	6	1	2	23	58
Whooping Cough . . . . .	...	...	1	1	13	13	13	17	56	24	18	7	4	38	77
Scarlet Fever . . . . .	...	...	...	...	...	2	1	2	7	...	...	2	3	1	8
Diphtheria . . . . .	...	...	...	...	...	2	1	2	5	10	6	1	2	3	12
Typhoid Fever . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Epidemic Cerebro-Spinal Meningitis . . . . .	...	...	...	...	...	...	...	...	1	...	...	...	...	0.2	0.4
Burns and Scalds . . . . .	...	...	...	...	...	...	1	1	1	...	5	1	...	7	10
Suffocation	1	...	...	1	6	1	...	...	1	...	...	1	...	8	8
Other Accidents . . . . .	...	...	...	...	...	...	...	...	...	...	2	2	...	1	4
Other Causes	5	1	6	4	26	12	9	9	56	17	6	4	3	45	62
ALL CAUSES.	130	46	38	30	371	116	100	84	671	133	80	38	22	944	912
Average for preceding 5 years	109	32	29	23	327	131	95	79	632	161	58	37	24	...	...

*This column includes all deaths in preceding columns.

was miasmatic diseases, with 28 deaths; but this number is not high when it is considered that 1,638 known attacks of the principal infectious diseases occurred among children of this age during the year. In marked contradistinction from the deaths at the "infant" period, only 8 deaths at the "school" period were due to diseases of the respiratory system. There were 8 deaths from accident or violence, none of which was due to burning or scalding.

At the "adolescent" age-period, there were 120 deaths. Tuberculous diseases led more distinctly here than at the "school" period, 43 deaths being due to this cause. Miasmatic diseases produced only 6 deaths. Diseases of the digestive system (including diarrhœa) caused 13 deaths; diseases of the circulatory system, 12 deaths; and diseases of the respiratory system, 8 deaths. There were 10 deaths from accident or violence, being 4 more than in the preceding year.

At the "mature" age-period, with a total of 652 deaths, the most prominent cause of death was diseases of the circulatory system, with 151 deaths. Tuberculous diseases came next, with 126 deaths, and were followed by diseases of the respiratory system and by malignant diseases, with 83 and 81 deaths, respectively. Deaths from accident and violence amounted to 32, being 16 fewer than in the preceding year.

At the "post-mature" age-period, with a total of 852 deaths, by far the chief cause of death was diseases of the circulatory system, with 348 deaths. Diseases of the respiratory system came next, with 147 deaths; and malignant diseases, with 99 deaths. It is interesting to note that, as in the preceding year, infectious diseases, in the form of influenza, caused at this age-period a much higher mortality rate than infectious diseases at any earlier age-period except the "infant" period. Accidents and violence accounted for 11 deaths.

VARIATIONS SINCE 1866 IN MORTALITY FROM SELECTED CAUSES.

The variations since the year 1866 in the mortality from selected causes at all ages can be conveniently followed in Table VI.

The total mortality from the more common *miasmatic* or *infectious diseases* was about equal to the average of the preceding five years, but under the average of the earlier years of the period under review. The variations in the mortality from the individual infectious diseases are referred to more particularly in the part of the report dealing especially with zymotic diseases; but it may be stated here that the mortality from scarlet fever, notwithstanding a large incidence of cases, was low; that the mortality from typhoid fever was also low; that the mortality from measles was under the average; and that the mortality from diphtheria and whooping cough was high, although under the average of the earlier decades in the period 1866-1898.

The mortality from *tuberculous diseases* during the past year has continued the remarkable decline which has been steadily going on for the past forty to fifty years. The decline last year was noticeable in practically every form of tuberculous disease, including pulmonary tuberculosis.

The mortality from *cancer* was the same as in the preceding year, when there was a slight fall, as compared with 1907. It, nevertheless, was nearly twice as high as the average for 1866-1875.

No definite advance was made in the course of the year in the search for the exact cause of this dreaded disease. It is, however, satisfactory that the search

TABLE VI.—DEATHS AT ALL AGES FROM SELECTED CAUSES
(per 100,000 of population).—*Years 1866-1909.*

YEAR.				Smallpox.	Scarlet Fever.	Diphtheria.	Measles.	Whooping Cough.	Influenza.	Typhus Fever.	Typhoid Fever.	Tuber- culous Diseases.		Dis. of Digest. Syst. (incl. Diarrhea).	Cancer and other Malignant Diseases.	Bronchitis.	Pneumonia.	Dis. of the Circul. Sys. (excl. Cereb. Apople and Hemipleg).
												Phthisis.	Other Tuberculous.					
1909,	-	-	-	0	7	18	18	62	15	0	3	99	49	109	100	99	123	190
1908,	-	-	-	0	8	11	38	35	30	0	0	103	57	109	100	94	114	203
1907	-	-	-	0	3	11	21	47	13	0	4	109	65	102	104	108	112	173
1906,	-	-	-	0	4	11	42	39	17	0	2	124	67	127	82	99	105	181
1905,	-	-	-	0	7	6	20	20	20	8	2	121	57	149	87	120	128	198
1904,	-	-	-	0	13	7	58	91	8	5	2	120	75	160	99	130	130	204
Average 1904-1908,				0	7	9	36	46	18	3	2	115	64	129	94	110	118	192
1903,	-	-	-	0	8	8	73	27	14	0	2	143	64	183	83	142	114	217
1902,	-	-	-	0	7	13	11	82	29	0	2	136	76	153	88	144	134	225
1901,	-	-	-	0.6	6	10	41	10	27	0	10	132	79	196	95	162	124	220
1900,	-	-	-	0	7	20	37	60	54	0	7	166	66	190	87	170	123	211
1899,	-	-	-	0	11	20	90	34	34	0	15	153	78	180	98	159	111	180
Average 1899-1903,				0.1	8	14	50	43	32	0	7	146	73	180	90	155	121	211
„	1886-1895,			0.6	18	16	73	60	34	1	12	185	70	199	76	217	105	169
„	1876-1885,			0.4	24	22	32	67	1	13	21	215	87	189	65	268	77	125
„	1866-1875,			2.6	72	23	53	67	6	37	42	271	119	240	59	267	67	133

actively continues in more than one specially equipped and endowed institute, and that the work is in the hands of men of acknowledged skill and ability. Other diseases have yielded their secrets to research in recent years. It is practically certain that cancer will not prove an exception, although, owing to the special difficulties of the problem, some years may elapse before the end is reached.

The mortality from *bronchitis* was very low, although not so low as in the preceding year. It was, however, scarcely more than one-third of the mortality in 1866-1875.

It is of much interest to note that the deaths from this disease have fallen almost *pari-passu* with the deaths from pulmonary phthisis, thus clearing showing that the great reduction in deaths from phthisis is not due to a transference to bronchitis in recent years, owing to improved diagnosis, of deaths which formerly would have been attributed to phthisis.

The death-rate from *pneumonia* showed a considerable increase during the year, and is above the average for the preceding five years. The death-rate from this disease has not changed materially during the last ten years, but it is nearly twice as high as the average rate in 1866-1875. During that decade, pulmonary phthisis and bronchitis caused, each, four times as many deaths as pneumonia; but during last year pneumonia was the cause of considerably more deaths than either of these two diseases. This is a striking change. As I have stated in previous reports, it is desirable that pneumonia should receive from the hygienist more attention than it has hitherto done, more especially as many of the cases are due to a micro-organism. Many cases are of a distinctly zymotic character, although the infectivity appears to be low.

The increase in deaths from pneumonia during the past year as compared with the preceding year was mainly confined to infants and to aged persons. I have already referred to the sudden and high prevalence of the disease among infants in the last month of the year.

The death-rate from *diseases of the digestive system, including diarrhoea*, remained the same as in the previous year, and was slightly higher than in 1907; but the rate for 1907 was the lowest on record, and was considerably under half of the average rate in 1866-1875.

The death-rate from *diseases of the circulatory system* (excluding cerebral-apoplexy and hemiplegia) has, on the whole, grown during the last forty years. It reached its greatest height in 1902, and has declined steadily since that time until 1908, when it rose almost to the level of 1902. Last year it showed a fall. Like the mortality from pneumonia, it seems to be exhibiting no decided trend during the past ten years.

MORBIDITY AND MORTALITY FROM ZYMOTICS.

(Tables VII., VIII., and IX.).

Table VII. gives the distribution of the commoner zymotic diseases as notified or discovered throughout the various wards of the city during the past year. It will be observed that scarlet fever was most prevalent in the St. Machar Ward, and least prevalent in St. Clement's. In the preceding year, St. Clement's also occupied the same favoured position.

TABLE VII.—CASES OF INFECTIOUS DISEASE NOTIFIED OR DISCOVERED—YEAR 1909

(Not corrected for transferred deaths—see page 6.)

DISEASE.	AGE OF PATIENTS.			WARD OF CITY.*											Total Cases.
	Und'r 5 years	5-15 years	15+ years	Woodside.	St. Machar.	St. Andrew's	St. Clement's.	Greyfriars.	St. Nicholas.	Rosemount.	Rubislaw.	Ruthrieston.	Ferryhill.	Torry.	
A. Compulsorily Notifiable.															
Smallpox . { Cases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Scarlet Fever { Cases	231	629	169	51	168	125	27	37	116	138	120	100	67	80	1029
Deaths	7	1	3	...	1	1	...	1	3	1	2	...	2	...	11
Diphtheria { Cases	94	144	53	15	54	45	12	13	23	26	40	23	34	6	291
Deaths	24	11	...	1	2	5	1	2	6	3	4	5	5	1	35
†Typhoid Fever { Cases	2	11	21	1	1	13	...	2	6	2	...	3	4	2	34
Deaths	...	1	4	...	1	...	...	...	2	...	...	2	...	...	5
Typhus Fever { Cases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Erysipelas { Cases	3	8	139	15	16	17	7	20	19	15	12	11	12	6	150
Deaths	2	1	2	...	2	...	1	1	1	...	...	...	...	...	5
Puerperal Fever { Cases	...	...	13	...	1	1	2	2	...	2	...	...	2	3	13
Deaths	...	...	3	...	...	...	2	1	...	1	...	...	1	3	8
Epidemic Cerebro-Spinal Meningitis { Cases	1	15	2	...	...	5	1	3	2	1	...	1	1	4	18
Deaths	1	7	2	...	...	3	...	2	2	...	...	1	1	1	10
B. Not Compulsorily Notifiable.															
†Measles . . { Cases	294	372	14	50	96	160	47	99	63	43	44	33	40	5	680
Deaths	31	2	...	3	1	10	2	6	4	3	1	2	1	...	33
†Whooping Cough { Cases	641	459	4	96	110	185	126	148	85	105	41	46	71	91	1104
Deaths	109	4	...	12	6	8	13	16	15	13	5	4	12	9	113
Total { Cases	1266	1638	415	228	446	551	222	324	314	332	257	217	231	197	3319
Deaths	174	27	19	16	13	27	19	29	33	21	12	14	22	14	220
Tuberculous Diseases—															
(a) Phthisis . Deaths	14	11	152	11	25	14	12	17	18	27	15	14	13	11	177
(b) Other Tub. Diseases } Deaths	51	22	21	8	6	7	11	11	15	8	10	9	7	2	94
Influenza . . Deaths	4	2	24	1	1	1	1	4	3	7	2	2	5	3	30
Chicken-Pox . Deaths	1	...	...	...	...	...	...	1	...	...	...	...	...	...	1

*Deaths occurring in Hospitals are assigned to the Ward of the City from which the cases were originally removed.

† Compulsory notification of these diseases ceased in February 1903.

‡ Including Para-typoid.

Diphtheria was most prevalent in St. Machar, and least prevalent in Torry. Measles was distinctly most prevalent in St. Andrew's, and least prevalent in Torry. Whooping cough was also most prevalent in St. Andrew's, and least prevalent in Rubislaw.

Cases of typhoid fever occurred chiefly in St. Andrew's. In St. Clement's and Rubislaw there were no cases; and in each of the two wards, Woodside and St. Machar, there was only one.

Epidemic cerebro-spinal meningitis was most prevalent in St. Andrew's and Torry, in which there were 5 and 4 cases, respectively; in Greyfriars, there were 3 cases; in St. Nicholas, 2; and 1 in each of the four wards, St. Clement's, Rosemount, Ruthrieston, and Ferryhill. In Woodside, St. Machar, and Rubislaw, there were no cases. The wide distribution of the disease is interesting in relation to the small number of cases, but it does not differ much in this respect from the ordinary zymotics.

Erysipelas was most prevalent in Greyfriars, and least prevalent in Torry.

Puerperal fever produced 3 cases in Torry. In each of four other wards, there were 2 cases; and in each of two wards, 1.

The ward chiefly associated with pulmonary phthisis was Rosemount; in the preceding year it was also Rosemount. Rosemount is one of the most populous wards, but is less populous than at least four other wards. The wards least associated with phthisis were Torry and Woodside; but the population of each of these wards is, relatively, not high.

Deaths from other forms of tuberculous disease were most common in St. Nicholas, and least common in Torry.

Influenza, as judged by the number of deaths, was most prevalent in Rosemount, in which ward there were 7 deaths; and least prevalent in Woodside, St. Machar, St. Andrew's, and St. Clement's, in each of which there was only one death.

Table VIII. gives the incidence of each of the commoner infectious diseases during the twelve successive months of the year. Scarlet fever began the year with a high incidence, following upon its excessive prevalence during the last months of 1908. There were 183 cases in January, and they rapidly fell to 30 in July, but afterwards rose to 151 in October, and then began again to decline. Diphtheria also had a high prevalence at the beginning of the year, with 42 cases in the month of January, the number falling subsequently to 12 in May, and again rising towards the end of the year. Typhoid fever was irregular in its incidence, there being no cases in April and December, 10 cases in July, and 8 in October, with distinctly smaller numbers in the other months. Erysipelas was most prevalent in December, with 20 cases, and least prevalent in April, with 7. Puerperal fever produced 3 cases in each of the three months of March, August, and September. In all the remaining months there were only 4 cases.

Epidemic cerebro-spinal meningitis produced one or more cases in every month of the year, except January and October. The maximum number was 4 in April. In several months there were only 1 case or 2 cases.

As regards the non-notifiable diseases, for which the numbers are less reliable, being obtained largely from intimations through the attendance officers of the School Board, the minimum number for measles was in December, when there were only 3 cases, while the maximum number was in January, with 278 cases. From about the middle of the year, there were comparatively few cases of this disease. The

TABLE VIII.—INCIDENCE OF INFECTIOUS DISEASE DURING THE TWELVE MONTHS OF YEAR 1909.

(Not corrected for transferred deaths—see page 6.)

DISEASE.	1909.												Whole Year.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
A. Compulsorily Notifiable.													
Smallpox . . . { Cases	...	...	...	...	...	...	...	...	...	...	...	...	...
Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...
Scarlet Fever . . { Cases	183	108	73	38	43	49	30	74	128	151	91	61	1029
Deaths	2	...	1	...	1	...	...	...	1	2	...	4	11
Diphtheria . . . { Cases	42	31	20	19	12	18	17	17	26	31	27	31	291
Deaths	6	6	4	2	1	2	...	2	1	4	5	2	35
†Typhoid Fever . . { Cases	1	1	4	...	3	2	10	2	2	8	1	...	34
Deaths	...	1	2	...	1	...	...	...	...	...	1	...	5
Typhus Fever . . . { Cases	...	...	...	...	...	...	...	...	...	...	...	...	...
Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...
Erysipelas . . . { Cases	17	14	11	7	9	9	11	15	12	12	13	20	150
Deaths	...	...	1	...	...	1	...	1	...	...	1	1	5
Puerperal Fever . . { Cases	2	...	3	...	1	...	1	3	3	...	...	...	13
Deaths	1	...	2	...	1	...	...	3	1	...	...	...	8
Epidemic Cerebro-Spinal Meningitis { Cases	...	1	1	4	2	2	1	3	1	...	1	2	18
Deaths	...	1	1	1	...	1	...	3	1	...	...	2	10
B. Not Compulsorily Notifiable.													
†Measles . . . { Cases	278	154	76	39	47	17	18	6	13	15	14	3	680
Deaths	4	8	3	4	3	3	2	2	...	1	1	2	33
†Whooping Cough . . { Cases	237	192	205	148	83	49	18	12	21	28	73	38	1104
Deaths	19	20	30	16	7	7	4	1	2	...	3	4	113
Total . . . { Cases	760	501	393	255	200	146	106	132	206	245	220	155	3319
Deaths	32	36	44	23	14	14	6	12	6	7	11	15	220
Tuberculous Diseases—													
(a) Phthisis . . . Deaths	15	19	22	17	19	10	13	22	9	8	8	15	177
(b) Other Tuber. Dis., Deaths	6	5	15	10	9	13	12	8	7	2	5	2	94
Influenza Deaths	1	4	3	7	3	6	1	1	...	...	1	3	30
Chicken-Pox . . . Deaths	...	...	...	...	...	1	...	...	...	...	...	...	1

† Compulsory notification ceased in February, 1903. ; Including Para-typhoid.

minimum number for whooping cough was in August, with 12 cases; and the maximum number was in January, with 237 cases.

The greatest number of deaths from pulmonary phthisis took place in March and August, in each of which months there were 22; and the lowest number, 8, occurred in each of the two months, October and November. Other tuberculous diseases had their highest mortality in March, with 15 deaths; and their lowest in October and December, with 2 in each month.

Influenza caused most deaths in April and June. There were none in September and October.

Table IX. contains a comparison of the prevalence of the various zymotics in 1909 with the prevalence in each of the preceding ten years. The averages for these ten years and the previous decade are also given. The number of sicknesses is stated for each disease, with the number of deaths, as also the case-mortality or percentage of deaths to sicknesses.

Compulsory notification of measles and whooping cough was discontinued early in February, 1903. Since that time, as has been stated, information in regard to cases of these diseases has been obtained chiefly from the school attendance officers, and to a slight extent from voluntary information from parents. This affects the case-mortality from these two diseases, as since 1903 the cases intimated can form only a proportion—although a fairly large proportion—of the cases actually occurring. This naturally tends to heighten the apparent case-mortality, as it has to be calculated upon too small a number of cases.

The table shows that during the past year the total known cases (3,138) of the seven zymotics embraced in the table were below the annual average (4,044) in the decade 1889-98, as also below the average (4,375) for the decade 1899-1908. The most prevalent zymotic was whooping cough, with 1,104 cases, and was closely followed by scarlet fever, with 1,029 cases; measles coming next, with 680 cases; diphtheria, with 291 cases; and typhoid fever, with 34 cases.

In addition to the cases of the seven principal zymotics, there were also 150 cases of erysipelas, 18 of epidemic cerebro-spinal meningitis, and 13 of puerperal fever.

Smallpox.—No case of this disease occurred during the year. During the preceding ten years, there have been, in all, only 12 cases of smallpox, with 1 death, the last case having occurred in 1907. Since the passing of the Vaccination (Scotland) Act, 1907, I have, by the authority of the Town Council, been obtaining quarterly from the registrars the number of children regarding whom the parents have declared formally that they had conscientious objection to their vaccination. The accompanying table (Table X.) shows the proportion of vaccinations to surviving children in 1907, 1908, and 1909, and, for comparison, in 1880, 1890, 1900, and 1906. The new Act did not come into operation until the later part of 1907, but it provided for a declaration being accepted in regard to children born previously who had so far remained unvaccinated. The numbers given for the years 1907, 1908, and 1909 apply, however, only to children born within the particular year. In addition to those included in the table, declarations were made on account of some children born before 1907.

In 1907, 82 children, or 2.0 per cent. of the surviving children, were not vaccinated by reason of the conscientious objection of their parents. In 1908, by which time the Act was in full operation, the number had risen to 218, or 5.5 per cent.

TABLE X.—NUMBER AND PERCENTAGE OF VACCINATIONS IN ABERDEEN.

	1908.					1909.											
	1880.	1890.	1900.	1906.	1907.	Registration Districts.					Whole City.						
						St. Nicholas.	St. Machar.	Woodside.	Old Aberdeen.	Nigg and Peterculter.	St. Nicholas.	St. Machar.	Woodside.	Old Aberdeen.	Nigg and Peterculter.		
Children Born	3613	3447	4807	4710	4504	1665	2068	231	79	407	4450	1745	2030	231	70	416	4492
Died before Vaccination	348	406	508	535	470	251	176	34	6	44	511	251	194	32	7	42	526
Surviving Children	3265	3041	4239	4175	4034	1414	1892	197	73	363	3939	1494	1836	199	63	374	3966
A. Successfully Vaccinated	Number ...	3221	2927	3790	3455	1182	1635	172	66	297	3352	1273	1568	180	60	301	3382
	Percentage	99	96	91	86	84	86	87	90	82	85	85	85	90	95	80	85
B. Insusceptible of Vaccination	Number ...	7	4	3	11	2	1	3	0	3	9	4	7	1	...	2	14
	Percentage	0·2	0·1	0·07	0·3	0·1	0·1	1·5	0·0	0·8	0·2	0·3	0·4	0·5	...	0·5	0·4
C. Not Vaccinated — Statutory Declaration of Conscientious Objection	Number ...	...	...	...	82	69	100	22	5	22	218	101	176	18	2	38	335
	Percentage	...	...	...	2·0	4·9	5·3	11·2	6·9	6·1	5·5	6·7	9·6	9·0	3·2	10·2	8·4
D. Remainder of Surviving Children	Number ...	37	110	382	486	161	156	0	2	41	360	116	85	...	1	33	235
	Percentage	1·1	3·6	9·1	12·0	11·4	8·2	0·0	2·7	11·3	9·1	7·8	4·6	...	1·6	8·8	6·0

In 1909, there was a further rise to 335 children, or 8.4 per cent. The district with the largest proportion of conscientious objectors was Nigg, with 10.2 per cent. St. Machar also stood high, with 9.6 per cent.; as also did Woodside, with 9.0 per cent. The lowest was Old Aberdeen, with 3.2 per cent. If to these numbers are added the number of children remaining unvaccinated because of postponement of vaccination or removal from the city, or otherwise unaccounted for, and if the small number of children stated to be insusceptible of vaccination is also included, it is found that the total percentage of infants remaining unvaccinated for 1909 was 14.8 per cent. In 1908, it was also 14.8; in 1907, it was 14.3; in 1900, it was only 3.8; while in 1880, it was as low as 1.3. Although there has been a large increase in the proportion of unvaccinated children during the past three or four years, a grain of comfort may be drawn from the fact that the percentage has not increased in 1909, as compared with 1908. At the same time, a proportion of unvaccinated persons amounting to nearly 15 per cent. cannot fail to prove a calamity in the not very remote future should an epidemic of smallpox occur.

I would desire, in the prospect of the new census, when alterations in the form of the returns of the Registrar-General are more likely to be made, to call attention to the fact that the annual vaccination returns are somewhat deficient in the statement of successful vaccinations, with the result that the vaccinations are underestimated. The vaccination register for children born within any one year is not closed until the end of the following year, in order to allow of the record including the vaccination of such children as took place in such following year, but the children that still remain unvaccinated are carried to the list of children that are classed as unvaccinated because of postponement or on account of their being no longer traceable. All who remain thus unvaccinated are at least one year old, but a considerable number of them are vaccinated later, and their vaccination is registered, although the vaccination never appears in the published returns of the Registrar-General, as he is presumed to have closed the record for the particular year. It would conduce to a truer statement of the position of the population in regard to vaccination were the Registrar-General to publish in each year the number of such vaccinations.

Measles.—The epidemic of this disease which prevailed in the early months of 1908 was renewed in lesser measure in the last months of 1908 and the earlier months of 1909, but by the end of the year the cases had fallen to very few. The total number of cases coming to the knowledge of the Public Health Department during the year was 680, as compared with 1,346 in the preceding year. In both years the case-mortality was 4.9 per cent. The case-mortality is higher than the average preceding the year when compulsory notification of this disease ceased; but this higher mortality is almost certainly due to a considerable number of the cases not becoming known to the Department, and, therefore, to the case-mortality being calculated on an unduly small number of sicknesses.

Whooping cough was distinctly more prevalent than in the preceding year, but was slightly under the average for the preceding ten years. Here, as with measles, owing to the notification of this disease having ceased to be compulsory, the cases coming to the knowledge of the Department were probably considerably fewer than the number which actually occurred. The case-mortality was 10.2 per cent. But even when adequate allowance is made for the case-mortality being reckoned upon too small a number of sicknesses, the mortality is high.

During the year, 146 deaths from measles and whooping cough occurred. From all other zymotics taken together (excluding tuberculosis, and also erysipelas and puerperal fever) there were only 61 deaths.

A fresh interest has arisen recently in certain large towns in the south in regard to the measures to be taken to reduce, if possible, this high mortality, and suggestions have been made for removing a considerable proportion of the cases of measles and whooping cough to the fever hospitals, in order, not so much for the purpose of limiting, by isolation, the spread of the disease as for providing for the poorer children more satisfactory treatment and nursing than is usually obtainable in their own homes. It is my own opinion, expressed some years ago in a special report to the Town Council, after fully 20 years' experience of the compulsory notification of measles and whooping cough, that very little, if anything, can be done to control the spread of these two highly infectious diseases. I believe that practically every child in a large town is attacked by both diseases before reaching adult life. A few persons living in the country may escape, but practically none in a town. Many of the cases of whooping cough, when mild, pass unrecognised, the attack being attributed merely to an obstinate cold.

There is no doubt, however, that some lives could be saved by hospital treatment of the cases, especially if taken from homes where proper care is wanting. The difficulty is to find sufficient accommodation for them within the existing fever hospitals, which have been constructed to meet the demands chiefly of scarlet fever, diphtheria, and typhoid fever. Difficulty also arises from the fact of the very varying prevalence of these two zymotics, so that, after months of an almost entire absence of cases, there may be a sudden increase, amounting to many hundreds, in a single month. Such extreme fluctuations are not met with, as a rule, in scarlet fever and diphtheria. It is, however, a question whether, even without a further extension of hospital accommodation, room might not be found for the more pressing cases of measles and whooping cough by excluding a certain proportion of the cases of scarlet fever. The case-mortality from scarlet fever is now extraordinarily low, and many of the cases admitted to hospital might make an equally good recovery at home, if the home were satisfactory. On the whole, I am inclined to the opinion that the time has arrived for a gradual revision of the practice in regard to the removal to hospital of cases of the more common zymotic diseases, with a view to a diminished admission of cases of scarlet fever, and an increased admission of cases of zymotics with a higher case-mortality. It may be that in the future, as in the past, scarlet fever will again have a high case-mortality. When that occurs, a return to the present practice would receive some justification.

Scarlet Fever has been exceptionally prevalent during the past two years, 1,262 cases having been reported in 1908 and 1,029 in 1909. This high prevalence has followed upon a prolonged period of low prevalence, the average number of cases for the ten years preceding 1908 being 441. The case-mortality has been very low since the commencement of 1907. In 1907, it was only 1.0 per cent; in 1908, 1.3; and in 1909, 1.1. In the five years preceding 1907, the average case-mortality was 3.8 per cent.

It is rare at the present time to find a case of scarlet fever ending fatally if the patient was enjoying good health before being attacked.

Diphtheria has, along with scarlet fever, been exhibiting recently a distinctly

higher prevalence than it did for some years. In 1908, 280 cases were notified, and 291 in 1909. This is about 100 above the yearly average for the previous 10 years.

Unfortunately, the case-mortality has not, as with scarlet fever, fallen simultaneously with the increase of cases. The mortality in 1909 was 12.0 per cent. This is the highest case-mortality for diphtheria since 1900. In the ten years ending 1900, the case-mortality was about 25 per cent. The decline since 1900 is probably to be attributed in large measure to treatment with antitoxin. It may, however, be in part more apparent than real, on account of a larger number of cases being notified in recent years since bacteriological examinations have been made available for aiding the diagnosis of the medical attendant.

Diphtheria is a disease of very variable intensity. Many cases in almost every epidemic are so mild as to appear to require scarcely any treatment. Others present alarming symptoms from the outset. There are few zymotics in which, for serious cases, hospital treatment is more eagerly sought and more fully warranted.

It is, unfortunately, difficult to exercise any very effective control of the spread of the disease, owing to the large proportion of mild cases that pass unrecognised, even by those in intimate daily contact with them.

As I stated for the cases in the preceding year, those in 1909 did not appear to be much associated with infection at school. Nearly one-half of the cases occurred among persons below or beyond the usual school age; and in no single school was there any great preponderance of cases. The 291 cases reported during the year were spread over 32 schools, the highest number in any single school being 15, at Sunnybank School.

Typhoid Fever, although of low prevalence last year in Aberdeen, as compared with many large towns elsewhere, produced 34 cases, or a greater number than in any of the preceding four years. In each of the two years, 1906 and 1908, there were only 16 cases.

Rather more than half the cases occurring last year were confined to the two months of July and October. The sudden increase of cases to 10 in the former month, from 2 in the preceding month, was due to an outbreak of 6 cases in one household and 3 cases in another. In each family the first case occurred some weeks before any of the succeeding cases. It is, therefore, clear that the infection of the other members was almost certainly due to the initial case, and not to any common cause acting from the outside, such as water or milk. The two families lived in different parts of the city, and had no relation to one another. In October, there were 8 cases, as against 2 in the preceding month; and 4 were in one family, and had been infected by another member of the family—a boy of eight years, who took ill in the preceding month. This boy, about two to three weeks before becoming ill, had been bathing in a small stream into which farm sewage is known to pass, but no cases of typhoid were found at the farm. In another family there were two cases—one consequent upon the other. Among the cases in October was that of a nurse in the City Hospital, who had been employed in the typhoid ward.

The majority of the cases were of a mild type. The case-mortality amounted, however, to 14.7 per cent., which is somewhat above the average for the preceding ten years.

Typhus Fever.—No case of this disease was reported during the year.

It may be remembered that in the annual report for 1905, in discussing an inter-

esting epidemic of typhus that occurred in the city in the last months of 1904 and the early months of 1905, I ventured upon the opinion, based on a careful etiological study of the cases, that typhus was probably transmitted by fleas, or other body vermin. This view has since been considerably discussed, and has, I think, met with some degree of acceptance. I would specially refer to two bacteriological investigations that have recently been made on the subject—one by Charles Nicolle, the results of which have just been published in the *Annals of the Pasteur Institute* at Paris, and the other by W. James Wilson, of Queen's University, Belfast, who contributed a paper to the *Journal of Hygiene*. Both investigations go to show that the causal germ exists in the blood, although the germ itself has not yet been definitely separated and identified, on account of the difficulty of finding a suitable medium for its growth. Nicolle, with the assistance of Comte and Conseil, has made experiments upon the transmission of the disease by inoculating a chimpanzee with the blood of a typhus fever patient, and has succeeded in reproducing the fever in the monkey. From the chimpanzee so infected, he has also succeeded in transmitting the disease to two other monkeys by means of lice which had been fed on the infected monkey, and were then allowed to bite the healthy animals. Anderson and Goldberger, in Mexico, have also produced evidence to incriminate body lice as the carriers of typhus infection. My own observations led me to believe that fleas were probably more active in conveying the infection than lice, and I am still inclined to think that further observations may show at least that fleas may play an important part. Anyhow, it is satisfactory, from the standpoint of the practical hygienist, to have obtained this experimental confirmation of the conveyance of typhus by body vermin. It may not be the only method by which infection is carried, but I believe it to be the most important, for reasons that I stated at full length in the report to which reference has already been made.

Epidemic Cerebro-Spinal Meningitis showed a considerable increase during the year, 18 cases having been notified, as against 4 in each of the preceding two years. Ten of the 18 cases died, and 8 made a good recovery. In 1908, 2 out of the 4 cases died; and in 1907, with 4 cases, all died. The treatment of the disease with Flexner's serum was commenced early in 1909, a supply having been obtained direct from the Rockefeller Institute, New York, of which Flexner is the medical director. Every case admitted to the hospital after the serum had been received was treated with it—in all, 13 cases. Eight made a good recovery, but the remaining five died. The death took place, in one case, after 4 days from the commencement of the illness; in another, in 5 days; in a third, in 6 days; in a fourth, in 8 days; and in the fifth case, in 31 days. The last case was also suffering from generalised tuberculosis, to which the death was largely due. The treatment was in each case commenced immediately on admission to hospital, and never later than 4 days from the commencement of the illness. Although the serum had thus failed to save life in a considerable proportion of cases, the proportion of recoveries was much greater than it had been among the cases previously admitted to the hospital. The clinical symptoms in several of these cases were distinctly severe, and in more than one case seemed to presage death. The medical resident and myself are of opinion that Flexner's serum is a remedy of great value in the treatment of this formidable disease.

No case was regarded as one of epidemic cerebro-spinal meningitis unless the characteristic micro-organism was found in the cerebro-spinal fluid. As usual, the

Department had its attention drawn to a few suspected cases, which proved, on bacteriological examination, not to be genuine cases. Three such cases were removed to the City Hospital for observation.

Of the 18 cases of cerebro-spinal meningitis notified during the year, only 2 of them occurred in the same family, or even within the same block of buildings, and there was no traceable relation between any of the cases. At the same time, as has been already noted, there was a preponderance of cases in the St. Andrew's Ward and in Torry, both wards being chiefly occupied by the working-classes. In common with some other zymotics, epidemic meningitis seems to be a disease, the occurrence of which depends more upon individual susceptibility than upon the presence of the germ. It is not uncommon to find the micro-organism in the naso-pharynx of the other members of a household in which a case of the disease has occurred. In a large barrack-room on the Continent, as many as 30 per cent. of the men occupying the room were found to have the germ in their throat, although only one of their number showed symptoms of the disease. We have made it an invariable rule in Aberdeen to remove for bacteriological examination some mucus from the naso-pharynx of each member of the household in which the notified case had occurred; but in only two households since the disease began to show itself in Aberdeen have the characteristic germs been found in apparently healthy members of the family.

The cases of cerebro-spinal meningitis in Aberdeen have been almost entirely confined to the smaller houses and to the working classes, and have rarely hitherto affected persons above 13 to 14 years of age. During 1909, however, there were 2 cases among adults—one a labourer of 58 years of age, who died after a day's illness, and the other a bank clerk of 22, who died after an illness of 8 days.

Erysipelas produced, as usual, a considerable number of cases (150), although 6 fewer than in the preceding year. In 1907, there were 212 cases. Only 5 deaths occurred in 1909, as against 7 in the preceding year.

Puerperal Fever.—Thirteen cases of this disease came to the knowledge of the Department during the year, or 7 more than in the preceding year. There were 8 deaths. As usual, few of the cases were notified by the medical attendant, and the knowledge of the cases was chiefly obtained from the intimations made, under agreement, by the registrars, who at once inform me of every death of a woman occurring within four weeks after child-birth; but no case has been entered as one of puerperal fever without previous communication with the medical attendant. In every case, the articles of clothing and bedding were at once disinfected, and the nurse or midwife was removed to the City Hospital for the thorough disinfection of her clothes and body, and especially her hands.

Influenza was not so fatal, and apparently not so prevalent, as in the immediately preceding year. There were 30 deaths, as against 49 in the preceding year, the deaths being as usual most numerous in the first half of the year.

TUBERCULOUS DISEASES.

(*Tables VI. and XI.*).

In an appendix to the present report will be found some notes on tuberculosis in Aberdeen. It is sufficient to state here, as has indeed already been remarked, that the mortality from tuberculous diseases continues to fall, and that the decline

TABLE XI.—DEATHS AT VARIOUS AGE-PERIODS FROM TUBERCULOUS DISEASES
IN YEAR 1909, WITH AVERAGE FOR PRECEDING TWO QUINQUENNA,

Compared with Deaths from Miasmatic Diseases and from All Causes.

	YEAR.	NUMBER OF DEATHS.					Number of Deaths from Tuberculous Diseases in every 100 Deaths from All Causes.
		Phthisis.	Other Tuberculous Diseases.	ALL TUBERCULOUS DISEASES.	ALL MIASMATIC DISEASES.	ALL CAUSES.	
ALL AGES - - -	1909 Av.	181	89	270	235	2675	10·1
	1904-1908	197	110	307	208	2598	11·8
	1899-1903	225	112	337	237	2791	12·1
Infant Period - - - 0—5 Years - - -	1909 Av.	12	49	61	177	944	6·5
	1904-1908	6	63	69	161	905	7·6
	1899-1903	7	61	68	166	982	6·9
School Period - - - 5—15 Years - - -	1909 Av.	11	19	30	28	107	28·0
	1904-1908	14	25	39	11	104	37·5
	1899-1903	15	20	35	15	105	33·3
Adolescent Period - - - 15—25 Years - - -	1909 Av.	35	8	43	6	120	35·8
	1904-1908	51	8	59	4	119	49·6
	1899-1903	67	15	82	9	164	50·0
Mature Period - - - 25—60 Years - - -	1909 Av.	114	12	126	11	652	19·3
	1904-1908	116	13	129	14	636	20·3
	1899-1903	124	15	139	21	701	19·8
Post-Mature Period - - - 60 + Years - - -	1909 Av.	9	1	10	13	852	1·2
	1904-1908	10	1	11	18	835	1·3
	1899-1903	12	1	13	26	839	1·5

during last year was even more evident for other tuberculous diseases than for phthisis. The decline was shared by every age-period, although in largest measure by the "adolescent" period.

During the year there were 181 deaths from phthisis and 89 from other tuberculous diseases, or, in all, 270. These numbers represent death-rates of 99 and 49 per 100,000, respectively. Forty years ago, in the decade 1866-75, the corresponding death-rates were 271 and 119. Other towns have shared in this reduction, but in none of the larger towns in Scotland, even if the comparison be extended to all the twenty towns with a population of 25,000 and upwards, was the mortality-rate last year from tuberculous diseases so low as in Aberdeen.

On looking at Table VI., it will be seen that the decline in the death-rate from phthisis has been slow since 1907, and one is inclined at first to attribute this to the large amount of unemployment affecting the resisting power of the population during these years. But if the death-rate for each year since 1899 is noted, it will be observed that during these years the rate has tended to fall by sudden leaps, and that after each such leap it has shown, if anything, a disposition to rise slowly. Thus, in 1901, it fell to 132 from 166 in 1900, and then gradually rose to 143 in 1903; in 1904, it leapt down to 120, and then slowly rose to 124 in 1906; and, lastly, in 1907, it dropped to 109; but, instead of subsequently slowly rising, it has slowly fallen to 99 in 1909. The same feature has not been observed in the death-rate from other tuberculous diseases, although the fall there has not always been continuous.

During the year the Town Council resolved, in extending the City Hospital, so to construct one of the pavilions as to make it suitable for the reception and treatment of tuberculous cases, especially cases of phthisis. The pavilion will accommodate about 35 to 40 cases, and will be largely used for educational purposes.

BACTERIOLOGICAL EXAMINATIONS.

(*Table XII.*).

In Table XII. is given a summary of the bacteriological examinations made in the Bacteriological Department of the University by Professor Dean and his special assistant, Dr. Laing, under the agreement with the Town Council.

During the year, 1,116 examinations were made of material from cases of disease, exclusive of a few examinations in connection with meat inspection. The number shows an increase of 296 as compared with that of the preceding year. The examinations made for typhoid fever included, in the majority of the cases dealt with, the examinations of the blood, stools, and urine for the typhoid germ, as well as the Widal agglutinative test. Among the unspecified diseases there were a considerable number of examinations for the germ of epidemic cerebro-spinal meningitis.

There is still room for a more extensive utilisation of the bacteriological laboratory by the medical practitioners of the city, some of whom rarely have recourse to the valuable assistance which it is capable of rendering them in the diagnosis of doubtful cases.

A new agreement between Professor Dean and the Town Council and other contributing local authorities, chiefly the district and burghal authorities in the counties of Aberdeen, Kincardine, Banff, and Nairn, was entered into in the course of the year. Under this agreement, the sum to be paid by the contributing authorities was

TABLE XII.—BACTERIOLOGICAL EXAMINATIONS.

YEAR.	SUSPECTED DISEASES.																	OTHER DISEASES.	GRAND TOTAL.
	TYPHUS FEVER.				TYPHOID FEVER.				DIPHTHERIA.				TUBERCULOSIS.						
	Posi- tive.	Nega- tive.	Doubt- ful.	Total.	Posi- tive.	Nega- tive.	Doubt- ful.	Total.	Posi- tive.	Nega- tive.	Doubt- ful.	Total.	Posi- tive.	Nega- tive.	Doubt- ful.	Total.			
1909	27	83	0	110	189	469	0	658	87	180	0	267	81	1,116	
1908	25	121	0	146	213	202	0	415	73	161	0	234	25	820	
1907	31	139	0	170	163	214	0	377	69	186	0	246	31	824	
1906	19	92	0	111	176	222	0	398	84	178	0	262	5	776	
1905	93	214	0	307	8	76	0	84	104	124	0	228	83	182	0	265	1	885	
1904	17	95	0	112	160	162	0	322	83	154	0	237	7	678	
1903	24	105	1	130	180	150	0	330	60	95	0	155	4	619	
1902	31	79	1	111	162	131	3	296	67	128	0	195	3	605	
1901	139	58	2	199	104	172	7	283	61	81	0	142	9	633	
1900	108	48	6	162	74	95	4	173	37	64	0	101	4	440	

raised from £175 to £300. This was partly due to an increase of the work, and partly to the difficulty in obtaining for the salary previously allowed a whole-time assistant to Professor Dean. Professor Dean's own remuneration for superintending the work is practically nominal, and consists of an honorarium of £50.

The sum contributed by the various Authorities sharing in the agreement amounts approximately to 15s. 3d. per 1,000 of the population, and is collected by the City Chamberlain of Aberdeen.

All typhoid cases treated in the hospital have now their urine and stools examined for the specific germ, and are not discharged until after two negative results.

Samples of milk are now being examined yearly for the germ of tubercle by means of inoculation experiments. Such examinations had been previously made in certain years, but in restricted number.

COMPARISON WITH OTHER TOWNS.

(Tables XIII. and XIV.).

Two tables (XIII. and XIV.) are submitted in which a comparison is made between Aberdeen and other large towns in Scotland, and also Scotland as a whole, in regard to some of the more important features of their vital statistics. For the information contained in the tables, I am mainly indebted to the valuable Supplement to the Annual Report of the Local Government Board.

The figures given have in every instance been corrected for transferred deaths—that is, as explained in an earlier part of the report, for deaths transferred from the public health records in the places of their occurrence to the records of those places in which the persons have their home residence. But, while such corrections have been made for all the towns referred to in the tables, it is proper to mention that in each case the population on which the several rates have been estimated is the population as calculated by the Registrar-General from the last two censuses. In the

majority of the towns compared, the growth since the last census has probably, as in Aberdeen, been considerably under the calculated ratio. The various rates given in the tables are therefore, for several towns, including Aberdeen, probably too low. Dundee is, however, an exception, the estimated population being estimated on an unusually small ratio of increase between the censuses.

A further correction is introduced for the death-rate from all causes. This correction is necessary to a strict comparison between the towns, owing to differences in sex and age distribution, as explained in preceding annual reports. Aberdeen is so constituted, in respect of such distribution, that the crude, or uncorrected, death-rate is slightly higher than the corrected rate; while for each of the other principal towns the reverse is true.

Table XIII. shows that, among the eight principal towns, Aberdeen had, along with Paisley, during the year the third lowest *birth-rate* (248 per 10,000 of population)—Edinburgh, with 208, and Perth, with 214, being lower. The town with the highest birth-rate was Dundee, with 273. Aberdeen occupied the same position as it did in each of the preceding two years. The birth-rate shows a slight fall in every town.

In respect of the *marriage-rate*, Aberdeen occupied the fourth highest place, with a rate of 74 per 10,000 of the population; Edinburgh, with 79, Perth, with 78, and Dundee, with 76, being higher. The lowest rate was in Greenock, with 58. In the preceding year, Aberdeen occupied the fifth place, Edinburgh, Glasgow, Perth, and Dundee being higher. In every town, except Aberdeen, the marriage-rate was lower—and in some instances considerably lower—than in the preceding year.

As regards the *death-rate from all causes* and at all ages, Aberdeen had, along with Perth, the third lowest crude death-rate (147 per 10,000), Edinburgh and Leith being slightly lower, with 144 each. Paisley, with 163, came next to Aberdeen and Perth; while the two towns with the highest rates were Dundee, with 182, and Glasgow, with 172.

With the death-rate corrected for age and sex distribution, Aberdeen takes the lowest place, with 146; Perth coming next, with 147; Dundee and Glasgow being highest, with 192 and 190 respectively.

In the preceding year (1908), Aberdeen had the second lowest crude death-rate and the lowest corrected death-rate. In 1906, Aberdeen stood lowest in respect of both the crude and the corrected rates.

In regard to *infantile mortality*, or deaths of infants under one year per 1,000 births, Aberdeen occupied the unsatisfactory position of being the highest, with 149 per 1,000 births. In the preceding year it was third highest. The town with the lowest rate was Perth, with 84; and was followed by Greenock, with 96; Edinburgh, with 114; Leith, with 116; Paisley, with 120; Glasgow, with 132; and Dundee, with 144. In every town, except Aberdeen and Paisley, the rate had fallen since the preceding year, the fall ranging from 33 in Perth to 1 in Edinburgh. In Aberdeen there was, on the contrary, an increase of 20, and in Paisley an increase of 6.

In respect of the mortality from the *seven chief zymotic diseases*, Aberdeen had the fifth lowest rate (10.8), Leith, Perth, Dundee, and Edinburgh being lower. Glasgow, with a high prevalence of nearly all the commoner zymotics, had the highest rate, viz., 17.8.

It is gratifying to find that Aberdeen continued, as in the preceding year, to have the lowest death-rate (9.9) from *pulmonary phthisis*; Perth coming next, with 10.6; and Edinburgh, with 12.0. The highest rate was in Dundee, with 17.1. There was a drop in every town except Paisley, where the rate rose to 12.9 from 11.9 in the preceding year.

The death-rate from *tuberculous diseases, other than pulmonary phthisis*, was also lowest in Aberdeen, with 4.9, Edinburgh coming next with 5.4; Greenock being highest, with 12.6. In the preceding year, Aberdeen was also the lowest, along with Perth.

TABLE XIII.—BIRTH, DEATH, AND MARRIAGE RATES DURING THE YEAR 1909.
Eight Principal Towns in Scotland.

	Glas- gow.	Edin- burgh.	Dundee	Aber- deen.	Paisley.	Leith.	Green- ock.	Perth.	All Scot- land.
Estimated population (in thousands).	872	336	169	182	92	86	72	37	4852
Marriage-Rate (per 10,000 of population).	73	79	76	74	62	60	58	78	62
Birth-Rate (per 10,000 of population).	263	208	273	248	248	269	271	214	264
Death-Rate—									
A—All ages..... (per 10,000 population).	172	144	182	147	163	144	165	147	153
(a) All causes, Corrected for Age and Sex Distribution...	190	150	192	146	171	153	173	147	153
(b) Seven chief Zymotics,...	17.8	9.6	8.0	10.8	17.0	4.6	11.8	5.7	9.8
(c) Pulmonary Phthisis, ...	12.7	12.0	17.1	9.9	12.9	12.4	14.0	10.6	11.8
(d) Other Tub. Diseases, ...	8.6	5.4	8.2	4.9	8.2	6.9	12.6	6.8	7.2
(e) Pneumonia, (chiefly Cancer),.....	17.4	13.5	17.0	12.3	11.9	13.7	11.9	2.4	11.0
Diseases of :—									
(g) Respiratory System (excluding Phthisis and Pneumonia),	16.9	11.6	17.4	11.8	18.6	12.5	13.1	20.6	14.5
(h) Circulatory System,	21.0	30.0	21.5	28.9	28.3	29.2	34.0	32.8	28.0
(i) Nervous System,	7.2	7.2	8.3	9.6	9.1	9.0	10.4	5.4	7.5
B—Infants under 1 year (per 1,000 births).	132	114	144	149	120	116	96	84	107

The death-rate from *pneumonia* was lowest in Perth, with 2.4; and highest in Glasgow, with 17.4. Aberdeen occupied an intermediate position, with 12.3

The death-rate from *malignant diseases* (chiefly cancer) was lowest in Glasgow, with 7.3; and highest in Leith, with 12.8. The rate in Aberdeen (10.0) occupied here, also, a middle position, and was slightly lower than in Edinburgh and Dundee, but distinctly higher than in Glasgow.

It is only since the Local Government Board began to issue its Supplement of Statistics of Mortality, in which corrections are made for transferred deaths, that it

has been possible to make a proper comparison between the different Scottish towns in respect of any of the causes of death. We are now in possession of such supplements for the three years ending 1909, and it is interesting to observe, with regard to the mortality from malignant diseases, that it is on the whole, and almost steadily, higher in the four principal towns situated on the East coast than in the five principal towns, including Govan and Partick, on the West coast. The following are the death-rates for each year per 10,000 of population:—

East Coast Towns.

		Edinburgh.		Leith.		Dundee.		Aberdeen.		Yearly Average.
1907	.	10.0	...	8.9	...	9.5	...	10.4	...	9.7
1908	.	10.6	...	11.7	...	10.4	...	10.0	...	10.7
1909	.	10.5	...	12.8	...	10.7	...	10.0	...	11.0

West Coast Towns.

		Glasgow.		Govan.		Partick.		Paisley.		Greenock.		Yearly Average.
1907	.	7.2	...	6.3	...	8.3	...	7.8	...	11.5	...	8.2
1908	.	7.7	...	6.4	...	6.9	...	6.2	...	7.9	...	7.0
1909	.	7.3	...	6.4	...	6.4	...	8.3	...	8.2	...	7.3

It will be observed that in 1909 the mortality from malignant diseases is almost 50 per cent. higher in the East coast than in the West coast towns; and also that in the East coast towns, with the exception of Aberdeen, there is a tendency to an increase of the rate.

The death-rate (11.8) from *lung diseases* (excluding phthisis and pneumonia) in Aberdeen was the second lowest, the rate (11.6) in Edinburgh being slightly lower. In the remaining towns, the death-rate ranged from 12.5 in Leith to 20.6 in Perth. In the preceding two years, Perth was also the highest and Edinburgh the lowest.

As I remarked in the report for the past two years, it is curious to note that, perhaps, the most sheltered of the eight towns compared has distinctly the highest mortality from lung diseases; while Edinburgh, with its free exposure to biting east winds, has the lowest.

In regard to the death-rate from *diseases of the circulatory system*, Aberdeen was fourth lowest, with 28.9; Glasgow being lowest, with 21.0. The highest was Greenock, with 34.0.

As to the death-rate from *diseases of the nervous system*, Aberdeen was second highest, with 9.6; and Perth was the lowest, with 5.4. The highest was Greenock, with 10.4.

In the next table (Table XIV.) a comparison is made between the four chief towns in respect of three of the more important zymotics.

The table shows that *scarlet fever* was more prevalent in Aberdeen than in any of the other three towns. The prevalence of *typhoid fever* and of *diphtheria* in Aberdeen, although higher than in Edinburgh, was lower than in Glasgow and Dundee.

The case-mortality from scarlet fever was lower in Aberdeen than in any of the other towns, being only 1.1 per cent. It ranged from 3.0 to 3.6 per cent. in the other three towns. The case-mortality from diphtheria was lowest in Edinburgh, with 9.0 per cent.; and highest in Dundee, with 12.9 per cent. In Aberdeen it was 11.3. The case-mortality from typhoid fever was 11.8 per cent. in Aberdeen, or

XIV.—DIPHTHERIA, SCARLET FEVER, AND TYPHOID FEVER IN 1909.

FOUR PRINCIPAL TOWNS IN SCOTLAND.

(Corrected for transferred deaths.)

CITY.	Popu- lation in Thousands as esti- mated by Regis- trars General.	TOTAL NUMBER OF CASES.			NUMBER OF CASES PER 10,000 OF POPULATION.			NUMBER OF DEATHS PER 100 CASES.			PERCENTAGE OF CASES TREATED IN HOSPITAL.			NUMBER OF DEATHS PER 10,000 OF POPULATION.		
		Diph- theria (incl Memb. group).	Scarlet Fever.	Typhoid Fever.	Diph- theria.	Scarlet Fever.	Typhoid Fever.	Diph- theria.	Scarlet Fever.	Typhoid Fever.	Diph- theria.	Scarlet Fever.	Typhoid Fever.	Diph- theria.	Scarlet Fever.	Typhoid Fever.
Aberdeen, . . .	182	291	1,030	34	16	57	1.9	11.3	1.1	11.8	83.8	82.8	91.2	1.8	0.6	0.2
Glasgow, . . .	872	1,846	4,410	566	21	51	6.5	12.0	3.6	16.4	88.5	91.8	96.5	2.5	1.8	1.1
Edinburgh, . . .	356	423	1,522	39	12	43	1.1	9.0	3.3	12.8	87.7	94.7	89.7	1.1	1.4	0.1
Dundee, . . .	169	303	779	34	18	46	2.0	12.9	3.0	11.8	28.4	49.2	67.6	2.3	1.4	0.2
All Scotland, . .	4,852	7,443	23,313	1,948	15	48	4.0	11.2	2.4	14.6	68.7	77.7	84.0	1.7	1.1	0.6

the same as in Dundee. In Edinburgh, and especially in Glasgow, it was distinctly higher.

As regards the percentage of cases treated in hospital, Aberdeen stood high, but not so high as Glasgow and Edinburgh in respect of diphtheria and scarlet fever, or so high as Glasgow for typhoid. The percentage of hospital-treated cases of scarlet fever in Aberdeen was 82.8, or somewhat lower than usual, but this was mainly due to the limited accommodation in the hospital relatively to the large number of cases seeking admission. In Dundee, however, the percentage of removals was still lower, with only 49.2; while in Edinburgh it was as high as 94.7. The percentage of cases of diphtheria treated in hospital in Aberdeen was 83.8. In Dundee it was only 28.4, and in Glasgow it reached 88.5. The percentage of cases of typhoid treated in hospital was 91.2 in Aberdeen, and was higher than in Edinburgh or Dundee.

WORKSHOPS.

(*Table XV.*)

The number of workshops (exclusive of factories) registered at the end of the year was 985. In the preceding year (1908) it was 1,029, and in the year 1907 it was 1,071. There was thus a reduction of 44 in the workshops as compared with the preceding year, and of 86 as compared with the year 1907.

The reduction extended over various trades, and was largest in furniture making, in which there were 10 fewer workshops than in the preceding year. Bakehouses showed a reduction of 5, as also did plumbing workshops. The workshops of blacksmiths were reduced by 4, and so also bootmaking shops. On the other hand, the workshops of fishcurers and packers were increased by 3, and of makers of wearing apparel by 4. In the preceding year there had been a reduction of no fewer than 23 among workshops of the last class.

The reduction was in some cases due to the workshops being converted into factories by the introduction of motive power. Owing to the convenience and the cheapness with which electrically driven machinery can be installed and operated, even in small workshops, the proportion of factories in recent years has considerably grown at the expense of the number of workshops.

The following tabular summary of the work done during the year by the sanitary staff, in the inspection and regulation of factories and workshops, has been prepared in accordance with the requirements of the Home Secretary, and was duly submitted to the Home Office. It ought to be noted that in the list of workshops the numbers relate to workshops solely, as legally defined in the Factory and Workshop Acts, and do not include factories.

Excellent work continues to be done by the Sanitary Inspector and his staff in the sanitary control of the workshops in the city. Every workshop is regularly inspected, and is kept in accordance with the requirements of the Public Health Acts. Structurally, the main objection to some of the workshops, especially to those associated with ordinary salesshops, is their underground position. It is difficult to secure good lighting and proper ventilation in such workshops, although no workshop is permitted in which it is not possible to carry on the work in a moderately lighted day without the continuous aid of artificial light. It has been the aim of the Sani-

TABLE XV.—FACTORIES, WORKSHOPS, LAUNDRIES, WORKPLACES, AND HOMEWORK.

1.—INSPECTION.

Including Inspections made by Sanitary Inspectors.

Premises.	No. of Inspections.	No. of Written Notices.	No. of Prosecutions.
Factories (including Factory Laundries), . . .	792	122	--
Workshops (including Workshop Laundries), . . .	1,190	109	--
Workplaces (other than Outworkers' premises included in Part 3 of this Report), . . .	146	7	—
Total,	2,128	238	—

2.—DEFECTS FOUND.

Particulars	Number of Defects.			Number of Prosecutions.
	Found.	Remedied.	Referred to H.M. Inspector.	
<i>Nuisances under the Public Health Acts :—*</i>				
Want of cleanliness,	84	85	—	--
Want of ventilation	2	3	—	—
Overcrowding,	1	1	--	--
Want of drainage of floors,	—	—	—	—
Other nuisances,	29	30	—	—
Sanitary accommodation {	insufficient,	5	5	—
	unsuitable or defective	6	13	—
	not separate for sexes,	—	1	--

Offences under the Factory and Workshop Act :—

Illegal occupation of underground bakehouse (s. 101)	—	—	—	—
Breach of special sanitary requirements for bakehouses (ss. 97 to 100),	102	95	—	—
Other offences (excluding offences relating to outwork which are included in Part 3 of this Report),	—	—	—	—
Total,	229	233	—	—

* Including those specified in sections 2, 3, 7, and 8 of the Factory and Workshop Act as remediable under the Public Health Acts.

3.—HOME WORK.

OUTWORKERS' LISTS, SECTION 107.

OUTWORKERS' LISTS, SECTION 107.																				
NATURE OF WORK.*	Lists received from Employers.						Addresses of Outworkers.		Prosecutions.		Inspections of Outworkers. Premises.		OUTWORK IN UNWHOLE- SOME PREMISES, SECTION 103.					OUTWORK IN INFECTED PREMISES, SECTIONS 109, 110.		
	Sending twice in the Year.		Sending once in the Year.																	
	Lists.†	Outworkers.†		Lists.	Outworkers.		Received from other Councils.	Forwarded to other Councils.	Notices served on Oc- cupiers as to keeping or sending Lists.	Failing to keep or permit Inspec- tion of Lists.	Failing to send Lists.	(14)	(15)	Prosecutions.	Instances.	Orders made (Section 110).	Prosecutions (Sections 109, 110).			
		Con- tractors	Work- men.		Con- tractors	Work- men.												(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)		
Wearing Apparel— (1) Making, etc. (2) Cleaning and washing Lace, lace curtains, and nets Artificial flowers Nets, other than wire nets Tents Sacks Furniture and upholstery Fur pulling Feather sorting Umbrellas, etc. Carding, etc., of buttons, etc. Paper bags and boxes Basket making Brush making Racquet and tennis balls . . . Stuffed toys File making Electro-plate Cables and chains Anchors and grapnels Cart gear Locks, latches, and keys . . . Pea picking	12	—	188	3	—	53	—	9	—	—	—	137	—	—	—	—	—			
TOTAL	12	—	188	3	—	53	—	9	—	—	—	137	—	—	—	—	—	—		

* If an occupier gives out work of more than one of the classes specified in column 1, and subdivides his list in such a way as to show the number of workers in each class of work, the list should be included among those in column 2 (or 5, as the case may be) against the principal class *only*, but the outworkers should be assigned in columns 3 and 4 (or 6 and 7) into their respective classes. A footnote should be added to show that this has been done.

† The figures required in columns 2, 3, and 4 are the *total* number of the lists received from those employers who comply strictly with the statutory duty of sending *two* lists each year and of the entries of names of outworkers in those lists. The entries in column 2 must necessarily be *even* numbers, as there will be two lists for each employer—in some previous returns odd numbers have been inserted. The figures in columns 3 and 4 will usually be (approximately) double of the number of individual outworkers whose names are given, since in the February and August lists of the same employer the same outworker's name will often be repeated.

‡ In view of the wide discrepancies found to exist between the totals in the two columns when the returns are added together, it is desired that care may be taken to give exact figures. Only those addresses should be counted which have actually been received from or forwarded to other Councils during the year covered by the report.

4.—REGISTERED WORKSHOPS.

Workshops on the Register at the end of the year :—

	Number.		Number.
Bakehouses,	19	Painters,	43
Blacksmiths,	26	Plumbers,	29
Bootmakers,	86	Stonecutters,	26
Fish Curers, }	135	Watchmakers and Jewellers,	37
Fish Packers, }		Wearing Apparel, Makers of,	361
Furniture, Makers of	51	Other Workshops,	237
Joiners,	35	Total No. of Workshops on Register,	985

5.—OTHER MATTERS.

Matters notified to H.M. Inspector of Factories :—

Class.	Number.
Failure to affix Abstract of the Factory and Workshop Act (s. 133),	—
Action taken in matters referred by H.M. Inspector as remediable under the Public Health Acts, but not under the Factory and Workshop Act (s. 5).	2
Other	2
	6

Underground Bakehouses (s. 101):—

Certificates granted during the year	—
In use at the end of the year.	10

tary Inspector and myself, with regard to underground workshops, to level them up to the standards demanded under the Factory and Workshop Acts for underground bakehouses. The time appears to us to have come when the regulations that are applicable to bakehouses should also be enforceable in regard to all workshops. The object of such regulations should be not only to secure better conditions in the production of the articles manufactured, but also to ensure that the health of the workers will not be unnecessarily depreciated. Whether the workers be bakers or tailors, they equally require that their work should be carried on under good sanitary conditions. One might go further and say that workshops should not only be levelled up to the requirements of bakehouses, but should be made as good as dwelling-houses. The Public Health Act lays down in considerable detail, and with strict regard to sanitary amenity, the conditions under which underground dwelling-houses are permissible; but, except for underground bakehouses, there are no regulations specially dealing with underground workshops. Good sanitary conditions are as much required in a workroom which may be occupied for 9 or 10 hours a day, and in which the occupation itself may assist in polluting the atmosphere, as in a dwelling-room which may be used for little more than sleeping purposes. Moreover, for workshops the space required by law for each workman in a workshop is only 250 cubic feet, whereas for dwelling-houses it is usually 400 cubic feet.

It is much to be regretted that in many workshops, admirably constructed in every respect, the workers themselves often fail to take advantage of the means of ventilation provided; although, owing to the recent public interest in the control

of tuberculosis, and occasional references to the subject in the public press, the working-classes are beginning to pay more attention to ventilation, and to realise its advantages.

In the preceding year notices against spitting were supplied to all workshops and factories in the city, and so far as one can judge from the appearance of floors, the habit of spitting is less common than it formerly was. Much depends upon the interest taken in the matter by the employers. Some vigorously enforce the advice of the notice, while others apparently give it no attention.

Bakehouses.—The bakehouses were, as usual, inspected every quarter during the year, and were found, as a rule, to be in a satisfactory condition, although there is still room for improvement among some of the smaller and even of the larger bakehouses in respect of general cleanliness and tidiness, and, particularly, in regard to the floors. The floor of a bakehouse cannot usually be cleaned by mere sweeping. It requires to be scraped; and such scraping is sometimes done at rather long intervals.

No fresh certificates for underground bakehouses, within the meaning of the Factory and Workshop Act, were granted during the year. At the end of the year, 10 certified underground bakehouses and baking-rooms existed in the city.

No plans were submitted during the year for new bakehouses; but in the case of one existing bakehouse, certain additions were made, the plans of which were revised and reported on by the Sanitary Inspector and myself.

Dairies.—The dairies have been regularly inspected throughout the year, and their condition was, on the whole, found to be satisfactory. The grooming of the cows is much more carefully attended to than it was a few years ago, although there is still room for some improvement in the cleanliness of the person and dress of those employed in milking the cows and handling the milk.

It is to be regretted that the proposal in a Dairies Bill recently before the Legislature to introduce a system of annual licence for dairies was struck out of the Bill. The kind of care required in the proper management of a dairy could better be enforced under a system of licensing than under bye-laws, unaided by the quickening effect of a possible withdrawal of licence. I do not believe that the power to refuse the renewal of a licence would be abused by the Local Authorities, and it would materially help in raising the standard of cleanliness in dairies.

Considerable improvement has in recent years been effected in the management of dairies, through the influence exercised by some of the larger milk sellers in the city, who take a scientific and hygienic interest in their business. They themselves arrange for the periodical inspection of the dairy farms from which they receive their milk supplies. They almost daily analyse the supplies, and they make use of the latest machinery for dealing with the milk in their dairies, and endeavour to send the milk out in the purest possible condition. Such dairymen are naturally an example to others, and tend to raise the standards throughout the whole trade.

I still think it desirable, however, that the Town Council should, if possible, arrange for the inspection, by a veterinary officer representing the Council, of all dairies outside the city, and supplying milk to it. The interest of the consumer in the purity of the milk supply is necessarily much greater than the interest of the producer, and it is scarcely reasonable to expect that the inspection of dairies by outside authorities will be so strict as the inspection by the city authorities.

INSPECTION OF PLANS.

As usual, a considerable number of plans—chiefly of factories and workshops, and especially of those in which foodstuffs are prepared, or in which there is any apprehension of nuisance—were examined and reported on by the Sanitary Inspector and myself. Thus, plans for 14 buildings were dealt with, 10 of which related to the construction or enlargement of fishcuring works. In the previous year, the number of plans examined was 32. Several recommendations in regard to improvements in lighting and ventilation, paving of floors, and the provision of sufficient sanitary conveniences were approved by the Town Council, and given effect to.

OFFENSIVE TRADES.

The offensive trades in Aberdeen, within the meaning of the Public Health Act, are concerned chiefly with tallow melting or oil extracting (from ox bones or fish livers), soap boiling, slaughtering, knackerings, hide factoring, and the manufacturing of manures, including fish manure, and a similar product, known as fish meal.

The manufacture of fish meal continued to receive considerable attention from the Local Authority during the year, owing to a persistent effort on the part of one fishcurer to obtain the sanction of the Authority to the erection of premises for making fish meal, notwithstanding their refusal in the preceding year, a refusal which, it may be recollected, was followed by an appeal by the fishcurer to the Local Government Board. The appeal was dismissed.

In order to obtain full information as to the most recent methods of manufacturing fish meal or fish manure—for they are practically the same product—a deputation from the Town Council, along with the Sanitary Inspector and myself, visited some of the most recently erected and most up-to-date fish meal or manure works in the South, notably, at Hull, Grimsby (Tetney Lock), and Fleetwood. A full report was presented on the subject by the deputation to the Town Council.

The deputation were satisfied that there was no real distinction in the process of manufacture, or in the product, between fish manure and fish meal, except, perhaps, in some cases in fineness of product. The difference was essentially a difference only in the use to which the material is applied. The processes of treating the raw material were found to differ somewhat in the different works. In every case the drying of the raw material was effected in a steam-jacketed cylinder or concentrator, but in certain works the drying was preceded by a preliminary cooking of the material by the direct injection of steam. In some works the material was crushed in a special machine before being dried. The preliminary cooking was chiefly for the purpose of shortening the period of drying. The removal of the steam and effluvia from the cylinders or concentrators in the course of the drying process was in some cases assisted by an extracting fan which at the same time hastens the evaporation by lowering the pressure within the cylinders. These effluvia form one of the chief sources of possible nuisance, and means were, therefore, employed in every manufactory to render them, as far as practicable, innocuous. With this object, the effluvia were in every case washed or condensed with water. The quantity of water required for the purpose was very large, and it was stated by men of much experience that it was hopeless to deal with the effluvia without an ample water supply. In some cases, the effluvia, after being washed, were passed through the furnace of an

ordinary steam boiler or through a special furnace or cremator. Except in one manufactory, no provision was found for removing the vapours from the dried material immediately after its withdrawal from the concentrators, and while it is being cooled. Such provision is of considerable advantage, as the odour is more intense when the material is hot. The usual practice was to cool and complete the drying of the product by spreading it in a thin layer over the floor. After the product is cooled, the odour is only slight, and is not objectionable.

The results of the observations and inquiries by the deputation led to the conclusion that no process has apparently yet been devised for the manufacture of fish manure or fish meal that will ensure that the manufacture can be carried on at all times and under all circumstances without the escape of offensive effluvia into the atmosphere, and without annoyance to the occupants of houses in the vicinity of the works. In the best arranged works, the escape of such effluvia in a gross form may only be occasional, but when it does occur it is the subject of distinct complaint by neighbouring residents. In some cases, complaints were made by persons residing in dwelling-houses at a distance of fully half a mile from the works.

On behalf of the committee, I communicated with Professor Noder, the Medical Officer of Health of Hamburg, in regard to a fish meal work at Eidelstadt, near Hamburg, which had been mentioned as a manufactory of the best and most modern continental type. Professor Noder replied that the work was purposely placed "in a rather lonely situation, and was not free from nuisance or objectionable effluvia," and added that in his opinion "it was not possible to carry away or destroy the whole bad smell from such manufactories by any process."

The result of the report by the deputation was to confirm the Town Council in its policy of withholding their sanction to the establishment of any additional fish manure or fish meal manufactory until it can be definitely shown that a process of manufacture has been devised that is free from nuisance.

Slaughter-houses.—The new slaughter-house of the Aberdeen Fishers' Incorporation was opened on 28th April, 1909. It is erected on the site of what was formerly known as the West Hutcheon Street Slaughter-house—an old, privately-owned slaughter-house, partly of wooden construction, and of antiquated arrangement, and tolerated in its later years only because of the constant expectation of the erection of a public slaughter-house that would compel the closure of all existing private slaughter-houses. The Incorporation acquired also a considerable area of adjacent ground, and were thus able not only to find ample space for their own premises but also to grant a site for a meat market and a hide factorage. With the occupation of the new slaughter-house, the Incorporation relinquished their premises in Wales Street. These premises have since been converted to other uses.

The slaughter-house of the Incorporation is almost sufficiently large to provide for the whole slaughtering of the city, but there still remain six other slaughter-houses—three of which are in Woodside. They are of relatively small size. As in the case of the old West Hutcheon Street Slaughter-house, and for the same reason, the owners, were not themselves taking the initiative in bringing their premises into strict keeping with modern requirements, had not for some time been strongly pressed by the Public Health Department. But after the erection of the new slaughter-house of the Incorporation was sanctioned, and the proposal for the erection of a Corporation slaughter-house had been definitely abandoned, pressure was

at once applied to the owner of every slaughter-house to have it brought, in respect of construction, into complete conformity with the requirements of the bye-laws of the Corporation. These requirements have now in every instance been fully complied with.

There can be no doubt that the ideal, and, indeed, the usual arrangement now-a-days in large towns, is to confine the whole of the slaughtering to one or more public slaughter-houses managed by the Corporation. A multiplicity of privately-owned slaughter-houses facilitates the evasion of the slaughter-house bye-laws, and increases greatly the difficulties of complete inspection. These difficulties, in Aberdeen, will, however, be lessened in the future, partly by the ready co-operation of the Fleshers' Incorporation to render all reasonable assistance to the Town Council, and partly by the recent appointment of an additional meat inspector. Hitherto the whole inspection has been done by one inspector, who had also to visit the fish-market, and give such attention as he could to butchers' shops and the numerous provision and fishcuring works; and it says much for his activity that any complaints that were ever made had reference to his doing too much rather than too little. The Department was, nevertheless, inadequately staffed in order to secure a sufficiently extensive inspection of meat and food. This was brought out clearly in a full report on the subject of meat inspection by the Sanitary Inspector and myself, which was submitted to the Public Health Committee about the middle of the year. The report showed that, while in Aberdeen, with 40,750 cattle, and 42,000 other animals (chiefly sheep), slaughtered annually, and with several slaughter-houses to be visited, there was only one meat inspector, there were, in Dundee, five inspectors (three being partly employed otherwise), with 16,000 cattle and 32,500 other animals, and only one slaughter-house. In Edinburgh, with 28,500 cattle and 182,500 other animals, and one slaughter-house, there were four inspectors. In Glasgow, with 60,000 cattle and 312,000 other animals, there were 19 inspectors. The relatively large number of cattle slaughtered in Aberdeen is, of course, due to the large trade in dead-meat with London.

A suggestion had been made that the new and additional inspector should hold a veterinary qualification, partly for the purpose of securing an inspector of high qualifications, and partly with the object of placing the meat inspection more distinctly under veterinary control. This suggestion proceeded mainly from the owners of cattle, who had the impression that the standards applied to the inspection and seizure of meat in Aberdeen was too high. The criticism was directed against the action of the officials of the Public Health Department in regard to tuberculous cattle. We therefore found it necessary in our report to point out that the Medical Officer of Health and Sanitary Inspector were the principal officers for the inspection of food under the Public Health Act; that in the various Regulations recently issued by the Local Government Board, under the Public Health (Regulations as to Food) Act, 1907, the Medical Officer was the only officer specially named; and that all certificates for exported meat could be signed by him only. These officers could not, therefore, even if they wished, divest themselves of their responsibilities, and it was highly undesirable, that by the addition of an independent officer, with different ideas as to standards, there should be a conflict of opinion among the officers of the same Local Authority. In any case, the real question to be settled, in the inspection and seizure of diseased meat, was whether the meat was fit for the food of man, and

whether the disease was communicable to man. The standards fall to be determined by the answer to this question, and the answer could properly be given only by those who had made a study of human diseases and of their etiology. The co-operation of a veterinary inspector with the ordinary health officers and sanitary inspector had already been provided for by the Town Council in the appointment of the University lecturer in veterinary hygiene, Mr. MacLauchlan Young, to a place in the Public Health Department as Veterinary Inspector of Dairies, and as a consulting officer for all purposes under the Public Health Act. The creation, however, of a practically separate authority, especially in the circumstances under which it was suggested, appeared to invite a discord of decisions on important matters affecting the public health. Happily, this was avoided by the Town Council resolving to appoint an additional lay inspector to work along with the previous inspector under the direction of the Medical Officer and Sanitary Inspector. The inspector holds the certificate for meat inspection granted by the Sanitary Association of Scotland.

Owing to the allegation that the standard followed by the Sanitary Inspector and myself in dealing with tuberculous carcasses was too severe and was much higher than in other towns, information was obtained with regard to the proportion of seizures of all kinds in other large Scottish towns, part seizures and whole carcass seizures being separately distinguished. The information was presented in the accompanying tabulated form, and, for comparison, similar information was supplied in regard to Aberdeen.

The seizures stated for Aberdeen include all seizures of carcasses in meat marts. Many of such carcasses are brought from slaughter-houses in the country. The percentage of seizures in Aberdeen is calculated in relation to the animals slaughtered within the city, and is, therefore, unduly high. During the year to which the table relates, 43 carcasses of cattle, 4 of calves, 56 of sheep, and 9 of pigs were seized, in whole or in part, in the meat marts. The figures for other towns may also in some cases have included carcasses similarly seized.

The percentage of carcasses of cattle seized in whole or part from all causes was, in Aberdeen, 0.82 per cent. In Glasgow it was 5.48 per cent., or more than 6 times greater; in Dundee, 3.1 per cent.; in Leith, 2.08 per cent.; and in Greenock, 4.63 per cent. In Paisley the percentage of seizures was about the same as in Aberdeen, namely, 0.83 per cent.; while in Edinburgh it was slightly lower, namely, 0.68 per cent.

A similar difference is observable in regard to seizures of cattle for tubercle. The percentage for Aberdeen was 0.42, or exactly the same as for Edinburgh; but in Glasgow it was 4.1 per cent.; in Dundee, 1.9; in Leith, 1.7; in Paisley, 0.6; and in Greenock, 3.9.

The striking difference in percentage of seizures is, no doubt, due in great measure to a difference in the proportion of cows—as distinguished from oxen and heifers—slaughtered in the different towns. Cows on account of their greater age at the time of slaughter, and also because of the character of their housing, are more frequently found to be tubercular than oxen and heifers. The proportion of cows is low in the slaughter-houses of both Aberdeen and Edinburgh.

As regards the proportion of partial seizures, it has been repeatedly alleged by butchers that partial seizures are less frequent in Aberdeen than elsewhere, and that the Department has been too ready to seize the whole carcass although the

TOWN, with Population as Estimated by Registrar-General.	A.—SEIZURES FOR ALL CAUSES (INCLUDING TUBERCLE).				B.—SEIZURES FOR TUBERCLE ONLY.			
	No. of Animals Slaughtered.				Percentage of Seizures to Animals Slaughtered.			
	No. of Carcases Seized (Whole or Part).				No. of Carcases of Cattle Seized (Whole or Part).			
	Cattle.	Calves.	Sheep.	Pigs.	Cattle.	Calves.	Sheep.	Pigs.
Aberdeen . 178,210	40,650	100	40,000	2,000	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.
GLASGOW . 859,715	60,165	5,170	254,948	51,860	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.
EDINBURGH 350,524	28,402	4,015	179,801	7,709	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.
LEITH . . 84,689	3,788	6	4,798	956	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.
DUNDEE . 168,616	19,137	684	33,759	5,052	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.
PAISLEY . 90,305	6,900	186	10,760	1,452	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.
GREENOCK . 71,783	5,729	1,973	19,294	1,192	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.	Whole Part . Total.

disease was limited to a part of the carcass. The table shows that the proportion of partial to whole seizures in Aberdeen did not differ greatly from that in other towns. In Aberdeen it was, for tubercular carcasses of cattle, very nearly 1 to 3. In Edinburgh it was almost exactly the same. In Glasgow and Dundee it was 1 to $1\frac{1}{2}$. In Greenock it was 1 to $2\frac{1}{3}$, while in Leith and Paisley there were apparently no partial seizures.

The public health officials in each of the towns stated that the standards followed in dealing with tuberculous meat were those of the Royal Commission. The only relaxation admitted was in regard to carcasses of pork, the Commission's standards for which are particularly high.

It has been urged that the Freibank system of dealing with tuberculous meat should be introduced into Aberdeen. This system is in use in several German towns, but I am not aware that it has been adopted anywhere in this country. The Sanitary Inspector and I brought it, some years ago, under the notice of a deputation of butchers who interviewed us regarding the inspection of tuberculous meat, but they were of opinion that it would not suit Aberdeen. The system usually consists in destroying the germs in the flesh of tubercular carcasses, by thorough cooking, or by sterilisation with steam under pressure in suitable iron cylinders. The meat is then sold in a special municipal shop in which only meat of this kind is dealt in. Such meat would probably be in limited demand in Aberdeen, and would be saleable only to the poorer people, and at a low price. The cost of cooking or sterilisation would be considerable, as would also be the expense of carrying on the special shop. The carcasses would not be sufficiently numerous or steady in supply to enable the shop to be kept constantly open. This cooked or sterilised tubercular meat, which would be sold definitely as such, would have to compete with the prime fore-quarter meat which is abundant in Aberdeen, and moderate in price, owing to the large export trade to London being chiefly confined to hind-quarter and rib meat. In Germany, we believe that meat of similar quality usually costs considerably more than in Aberdeen.

If, however, the butchers believe that the adoption of the Freibank system in Aberdeen would substantially diminish their loss from the seizure of tubercular carcasses, and if the Town Council is willing to provide the necessary cooking and sterilising plant, we have no objection to offer to the system; but it would have to be understood that the cooking and sterilisation must be done by the Council, or under its supervision, that the meat must be sold in a special shop, and that only such tubercular carcasses should thus be dealt with as are well fed and do not exhibit extensive evidence of tuberculosis.

HOUSING OF THE WORKING CLASSES.

No houses were closed during the year either under the Housing of the Working Classes Act or under the Aberdeen Corporation Act, 1881.

As has been previously reported, large clearances of old property have been made within recent years in Aberdeen, partly, for the direct purpose of removing insanitary houses and gutting insanitary areas, and, partly, in connection with city improvement schemes. At the present time, the Public Health Department is engaged

in a fresh survey of the older parts of the city with a view to determining whether further closure and demolition of houses would be justified.

Several underground apartments, that were found not to be in accordance with the requirements of the Public Health Act, were closed during the year. A number of apartments were also ordered to be discontinued as separate dwellings on account of their insufficient size. Constant attention is being given by the Sanitary Inspector and his staff to the maintenance of the houses of the working classes in good sanitary condition.

A large amount of work has been done in the proper hanging of window-sashes, so as to admit of the windows being easily opened for purposes of ventilation. There are still many of the older houses, the window-sashes of which were constructed without counter-balancing weights. Considerable reluctance has been shown by owners of property in fitting the sashes with weights, owing chiefly to the expense. Where the case of the window has not originally been constructed for the introduction of concealed weights, it is usually not possible to introduce such weights without reconstructing the case. This is rather expensive, especially for an old house with a small rent.

The Department has accordingly suggested that the sashes might be cheaply hung, without any alteration of the window or of the case, by a single weight working on the face of one splay of the window and attached to the middle of the top bar of the sash by a rope passing over two pulleys at the top of the window. We hope that before long there will be few dwelling-rooms in the city in which the windows are not arranged so as to permit of convenient and ample ventilation. It is, as has been remarked in a previous report, almost more important to provide for the free ventilation of rooms than for the proper ventilation of drains.

The Corporation Lodging-House continues to be of much service to the city, in providing a sanitary and properly regulated shelter for some of the poorest classes. It is to be regretted that the revenue from it is still considerably under the sum required to meet the expenditure, including interest and sinking fund. At the end of last financial year, the deficit on the year's working was upwards of £600. It cannot be denied, however, that it is a great advantage for both sanitary and police purposes to have the persons who require such accommodation housed for the most part in one large, well-planned, well-managed, and cleanly-kept lodging-house.

WEATHER AND DISEASE.

(Tables XVI. and XVII.)

As in the report for the preceding year, I have prepared a table summarising the state of the weather for each month throughout the year, and comparing it with the average for the ten years 1898-1907.

I have also supplied a table containing the number of deaths in each month from the more important diseases, together with the average number for the preceding five years. The numbers in this table have been corrected for transferred deaths. The number of persons dying at each age-period during each month is also given.

The meteorological averages for the ten years show that, in Aberdeen, February is the coldest month in the year—elsewhere it is more usually January—and that

TABLE XVI.—METEOROLOGICAL RECORD OF THE CITY OF ABERDEEN FOR EACH MONTH (From King's College Observatory).

YEAR 1909.													AVERAGE FOR TEN YEARS, 1897-1906.												
MONTH.	BAROMETRIC PRESSURE (at 32° F. and Sea Level).				TEMPERATURE OF ATMOSPHERE.				Mean Daily Temp. of Ground (4 feet below surface).	RELATIVE HUMIDITY (at 100°).	RAIN-FALL (if Snow, indicate by S.).		SUNSHINE.		DIRECTION; AND DURATION IN HOURS.								Velocity Average No. miles per day.		
	Inches.	Absol. Lowest.	Mean Daily Range.	Inches.	Absol. Highest.	Absol. Lowest.	Mean Daily Temp.	Mean Daily Range.			Duration.	Amount.	Percentage of possible Sunshine.	Dura- tion.	HOURS.	N.	N. E.	E.	S. E.	S.	S. W.	W.		N. W.	Calm
January, .	30.51	28.38	0.31	49.2	51.2	27.8	37.6	8.2	40.1	81	57	1.57	59.1	26	1	...	1	7	204	311	162	58	...	210	
February, .	30.58	29.24	0.23	51.2	54.2	28.6	38.9	7.4	38.8	79	40	0.64	57.6	22	43	9	57	42	159	112	108	142	...	201	
March, .	30.19	29.12	0.20	44.7	47.8	22.8	36.4	6.8	38.9	83	179	4.27	44.8	12	67	116	126	105	45	13	58	208	6	299	
April, .	30.51	29.23	0.20	61.2	65.2	32.2	43.6	11.1	41.5	79	88	3.04	157.6	37	48	36	22	132	170	104	104	102	2	178	
May, .	30.54	29.24	0.17	65.2	69.2	31.6	46.9	12.5	45.0	77	75	2.20	199.7	39	51	25	45	189	156	101	58	119	...	194	
June, .	30.36	29.31	0.13	63.1	66.1	30.5	50.5	9.9	49.4	78	55	1.53	150.4	29	163	96	89	76	43	19	52	182	...	181	
July, .	30.25	29.17	0.23	71.3	74.3	46.0	56.1	11.2	52.4	77	88	4.69	150.2	29	31	20	75	58	136	132	108	184	...	176	
August, .	30.25	29.40	0.17	76.4	79.4	44.2	56.8	11.4	54.2	77	86	2.43	149.7	32	69	60	51	73	139	118	80	154	...	161	
September, .	30.41	29.25	0.17	63.9	66.9	38.7	50.8	9.4	52.5	83	71	1.93	108.5	29	59	65	61	66	143	62	70	194	...	155	
October, .	30.31	28.81	0.28	61.6	64.6	29.7	47.3	10.4	50.3	81	76	2.14	111.8	36	26	10	...	45	248	177	78	160	...	225	
November, .	30.33	28.73	0.26	56.8	59.8	13.6	39.0	10.3	44.5	80	74	1.93	65.3	28	21	6	2	3	135	120	264	169	...	205	
December, .	30.08	28.18	0.36	46.9	49.9	22.5	37.0	6.9	40.6	80	102	3.92	48.6	24	17	10	55	63	142	133	212	112	...	208	
Monthly Average	30.41	29.01	0.23	59.3	62.3	31.2	45.1	9.6	45.7	80	83	2.52	108.6	29	50	38	49	72	143	125	113	149	0.7	199	
Total for Year, .	...	...	...	...	...	...	...	...	...	...	991	30.29	1303.3	343	596	453	584	859	1720	1502	1354	1784	8	2393
January, .	30.60	28.80	0.31	52.1	55.1	25.9	39.0	7.6	41.1	81	74	2.12	44.8	20	22	8	16	73	155	219	139	111	0.1	246.2	
February, .	30.48	28.78	0.29	51.3	54.3	21.7	37.5	8.5	39.7	79	82	2.20	76.8	29	32	10	24	49	140	149	132	139	...	243.1	
March, .	30.36	28.85	0.27	55.3	58.3	24.5	39.9	9.4	40.2	78	97	2.34	109.2	30	64	22	39	83	143	151	101	141	...	226.8	
April, .	30.37	29.09	0.24	59.4	62.4	30.2	42.9	10.6	42.2	78	101	2.46	162.2	39	41	24	55	102	170	100	107	120	0.1	226.8	
May, .	30.43	29.16	0.19	64.1	67.1	34.1	46.8	10.6	45.6	78	101	2.73	177.4	36	120	57	74	93	136	67	63	132	1.2	205.0	
June, .	30.42	29.43	0.14	69.7	72.7	38.4	52.9	11.0	50.1	78	59	1.51	179.5	34	96	51	94	114	144	58	114	0.5	172.4		
July, .	30.32	29.40	0.17	73.6	76.6	43.6	57.0	11.6	53.4	77	77	2.63	165.6	32	68	51	72	102	138	97	99	116	0.9	163.9	
August, .	30.30	29.27	0.19	72.6	75.6	42.8	56.1	11.0	53.4	79	77	2.54	157.1	34	51	36	60	97	178	113	93	116	0.9	161.5	
September, .	30.43	29.19	0.20	68.3	71.3	37.8	53.9	11.2	54.2	80	72	2.06	133.4	35	40	20	38	90	176	127	117	114	0.4	180.2	
October, .	30.45	28.95	0.25	61.5	64.5	33.7	47.4	9.8	50.2	82	105	2.80	98.4	31	33	15	35	66	170	167	125	133	...	208.6	
November, .	30.49	28.88	0.26	56.5	59.5	27.5	43.4	8.1	46.8	82	101	2.81	53.9	23	36	9	29	82	142	179	137	105	...	240.8	
December, .	30.48	28.61	0.30	53.9	56.9	23.8	39.7	8.0	43.1	82	121	2.89	33.5	17	22	4	20	81	163	218	140	95	0.1	239.2	
Monthly Average	30.43	29.03	0.23	61.5	64.5	32.0	46.4	9.8	46.7	80	89	2.45	116.0	30	52	26	46	86	155	137	108	120	0.4	209.5	
Total for Year, .	...	...	...	...	...	...	...	...	...	...	1067	29.39	1391.8	...	625	307	556	1032	1855	1645	1301	1436	4.2	...

* To indicate the dominant direction, every duration of 100 hours and upwards is in thick figures.

TABLE XVII.—NUMBER OF DEATHS FROM PRINCIPAL CAUSES IN EACH MONTH.

(Corrected for transferred deaths—see page 6.)

MONTH.	CAUSE OF DEATH.										AGES OF PERSONS DYING.															
	Measles.	Whooping Cough.	Scarlet Fever.	Diphtheria.	Typhoid.	Influenza.	TUBERCULOSIS.				Dis. of Digestive System (incl. Diarrhoea).	Pneumonia.	Bronchitis.	Circulatory Diseases.		Diseases of Urinary System.	Convulsions.	Prematurity.	Malignant Diseases.	Under 1 Year.	YEARS.				All Ages.	
							Lungs (Phtisis).	Brain (Tab. Meningitis).	Abdomen (Tab. Peritonitis).	Other.				Cerebral Apoplexy and Hemiplegia.	Other Diseases.						0-5	-15	-25	-60		+
YEAR 1909.																										
January,	4	19	2	6	0	1	16	1	0	5	18	24	24	15	43	6	9	11	13	50	92	10	10	67	95	274
February,	8	20	0	6	0	4	20	2	0	3	20	35	24	20	41	2	9	8	10	76	115	9	15	48	87	274
March,	3	30	1	4	2	3	20	10	0	3	13	36	29	8	31	10	8	12	23	90	130	12	15	75	80	312
April,	4	16	0	2	0	5	18	4	4	2	20	17	14	14	22	8	9	12	9	67	86	12	12	56	60	226
May,	3	7	1	1	1	0	5	11	3	4	23	14	4	13	28	10	9	16	16	59	78	7	7	61	79	232
June,	3	7	0	2	0	5	11	3	4	3	23	14	4	13	30	6	2	5	11	34	63	11	7	63	60	204
July,	2	4	0	0	0	1	15	3	7	2	13	11	7	14	23	5	3	7	16	36	49	11	15	45	57	177
August,	3	0	0	2	0	1	20	4	2	2	16	12	8	9	30	3	5	9	14	32	46	8	14	46	62	176
September,	0	2	1	1	0	0	10	2	3	2	16	10	4	9	27	4	0	15	14	41	58	6	6	43	53	166
October,	1	0	2	4	0	0	8	1	1	0	13	7	8	15	21	4	5	8	13	45	56	7	2	49	51	165
November,	1	3	0	5	1	1	8	1	3	1	14	16	14	21	24	5	1	15	28	63	75	7	4	54	84	224
December,	2	4	6	0	0	3	16	1	1	0	13	29	31	19	27	8	9	15	15	78	96	7	13	45	84	245
Total for year 1909.	34	112	13	33	5	27	181	37	28	24	199	223	181	179	345	71	62	126	182	671	944	107	120	652	852	2675
AVERAGE FOR PRECEDING FIVE YEARS—1904-08.																										
January,	10	8	1-8	2-2	0-4	3-8	15	4-2	2-8	3-6	19	29	31	16	30	6	5	10	15	71	104	10	11	65	87	277
February,	2-8	13	0-4	1-2	0-2	8-0	18	3-8	2-2	1-6	18	22	26	13	26	9	5	11	14	62	89	10	7	59	81	246
March,	4-6	8	1-8	0-6	0-2	7-0	20	4-8	4-2	2-2	18	22	25	13	34	8	6	9	14	57	90	10	11	64	83	258
April,	2-4	9	0-4	0-8	0-8	2-8	20	5-0	3-6	2-0	14	20	18	11	30	7	4-6	11	12	58	83	9	10	58	72	232
May,	2-0	10	0-4	1-0	0-4	1-0	19	7-0	4-2	3-0	18	18	10	11	30	6	3-6	9	12	48	71	11	10	55	74	221
June,	1-6	6	0-0	0-2	0-4	1-4	21	3-8	3-6	3-0	17	17	8	9	28	4-8	3-6	8	12	44	60	8	12	51	63	194
July,	2-0	6	0-4	0-6	0-2	0-0	11	3-2	2-6	1-4	14	14	7	13	21	4-2	5-0	8	14	40	55	5	6	42	57	179
August,	2-4	3-4	0-8	1-2	0	0-6	13	4-2	2-2	2-2	21	9	6	12	22	9	3-6	9	13	47	62	7	8	44	58	165
September,	1-2	2-8	1-6	1-2	0-2	0-2	12	2-4	1-6	2-8	23	11	7	8	23	6	3-4	7	13	45	59	8	10	43	49	169
October,	5	3-0	1-2	2-0	0-6	0-6	18	3-6	1-4	2-2	19	12	11	11	28	6	3-8	10	13	50	67	8	13	51	59	198
November,	10	4-2	1-4	1-8	0-2	1-6	13	3-2	2-8	1-4	18	13	13	13	31	4-8	4-4	10	16	50	72	7	9	52	70	210
December,	16	4-2	1-4	3-0	0-2	3-6	18	3-0	2-8	2-0	18	22	25	12	28	7	6	10	13	60	92	10	11	54	83	250
Average Total for 1904-08.	60	78	12	16	3-8	31	198	48	34	27	217	209	187	142	331	78	54	112	161	632	904	103	118	638	836	2599

July is the warmest. They also show that December receives the least sunshine, and June the most—five to six times more than December. June is also the driest month, while December is the wettest. The mean daily range of temperature—or the difference between the highest and the lowest for the day—is greatest from April to September, and is lowest in January. It increases rapidly between January and April. Northerly winds are distinctly more prevalent in May than in any other month, easterly winds prevail most in June, westerly winds in December and January, and southerly winds in December and January. The most windy months are January and February, and the least windy are July and August.

In 1909, the warmest month was August, but the coldest month was March, the next coldest being December. May was, as in the preceding year, distinctly the sunniest month, April coming next; while the month with the lowest sunshine was March. The wettest month was July, with rain greatly in excess of the average, but there was also much rain in March. The driest month was February. Northerly winds were most prevalent in June and March, and practically absent in January; while easterly winds were most prevalent in March and June, and least prevalent in January. Southerly winds were associated mainly with January and October, and least of all with March and June. Westerly winds were most abundant in January and December, and least in June. The most windy month was March, and the least windy was August. The almost entire absence of north and east winds in January is noteworthy.

Turning to the table of deaths, we find that, according to the average for the five years ending 1908, the most fatal month for the population as a whole is January, and the least fatal is July. The infantile mortality also reaches its maximum and minimum about the same time as the mortality for the population generally. Deaths of children of the "school" age are more numerous in winter and spring than at other periods of the year, and this is true also of deaths at the "mature" and "post-mature" age-periods.

During 1909, the highest mortality at all ages was in March, and the lowest was in September and October. The infantile mortality was also highest in March. March was distinctly cold and very wet, and deficient in sunshine. September, although associated with a low death-rate, was relatively cold and sunless, but the amount of wind was small. The very high infantile mortality in December from bronchitis and pneumonia, to which reference has already been made, was associated with a low temperature, a high rainfall, but a comparatively large amount of sunshine.

Apart from the question of the effect of the weather, the table of deaths shows that whooping cough was an important cause of death in the first four months; pneumonia and bronchitis, in February, March, and December; digestive diseases, including diarrhoea, in June; apoplexy and hemiplegia, in May, November, and February; and other diseases of the circulatory system in January and February. Pulmonary phthisis, as a cause of death, was least busy in October and November, and most busy in February, March, and August.

If the lungs are to be regarded as the organs that react most readily to weather conditions, and if bronchitis can be taken as a measure of this reaction, the most healthy months of the year in Aberdeen are usually from June to October, while the most unhealthy are from December to March. Last year the most healthy

months were also June to October, while the most unhealthy were March and December.

WATER SUPPLY.

The regular weekly analyses of the water supply which had been made in the preceding two years by Professor Hamilton and myself were discontinued at the commencement of 1909. They sufficiently and consistently showed that the water supply, although not containing a large amount of chemical impurity, was liable to have present in it an undue number of micro-organisms of a type indicative of dangerous sewage pollution. Several examinations that have been made incidentally since the beginning of 1909 agree in their results with those previously made.

In September of 1909, the Town Council, after having fully considered reports by various eminent engineers for the improvement of the water supply of the city, resolved, on the motion of the Lord Provost, to approach Parliament for the purpose of obtaining powers to replace the present water supply from the Dee by a new supply from the river Avon. As is well known, the Bill for this purpose, after evidence, for and against it, had been led at great length before a Committee of the House of Lords, was rejected by the Committee. The contention of those opposing the Bill was that the present supply from the river Dee could be made adequate in amount by some additional works at the intake, and that its purity could be sufficiently secured by some method of filtration or of storage and filtration. There is every reason to believe that the question of providing a more wholesome water supply for the city will not be allowed to rest, but whether the supply is to be obtained from the present source or from a new source is still more or less under discussion, and seems to depend upon the result of further engineering inquiries.

As Medical Officer of Health, having some official responsibility for the protection of the health of the city, I can only reiterate what I have stated in almost every one of my annual reports for several years that the present water supply must either be purified or a new and pure supply substituted for it. The danger from the present supply in its present condition may be remote, but it is certainly not negligible. On that point all the scientific witnesses, both for the promoters and for the opponents of the Bill, were agreed.

SEWERAGE.

Considerable progress was made during the year in carrying out the extensive works for the rearrangement of the main lines of drainage of the city, and, particularly, in bringing the sewage of the Woodside and Old Aberdeen districts into the main sewer now discharging itself at Girdleness. The sewage of Woodside is now no longer being carried into the river Don, and is being temporarily discharged into the old main sewer terminating within the mouth of the river Dee. It is expected that the connection with the Girdleness main sewer will be completed early in 1911.

RIVER DON.

This river, which has suffered from considerable pollution for many years, shows as yet few signs of improvement, in spite of the removal from it of the sewage of Woodside. The bulk of the pollution has been due to the large manufacturing factories on its banks, and, so far as can be judged from the appearance of the

water, which is usually considerably discoloured and charged with a large amount of suspended matter, the means employed for purifying the effluent from these works have not been very effective. The Town Council would, I think, be justified, since they are themselves no longer offenders, in stimulating the owners of the manufactories to greater activity in introducing the best methods for purifying their effluents. The proprietors of the large tweed works at Grandholm have, I am glad to be able to report, made arrangements with the Town Council to discharge the effluent from their works into the Woodside sewer near Grandholm Bridge.

Some domestic sewage also enters the Don from the villages of Bucksburn and Dyce. Steps should be taken by these villages to purify their sewage.

The Don, as it passes along the northern boundary of the city, is one of the most beautiful of Scottish rivers, and it is a great pity that its attractiveness should be impaired by preventible pollution. The effect of the pollution is especially noticeable in the tidal part of the river, where, after the ebbing of the tide, the banks are left covered with a slimy deposit, which, in hot weather, generates unpleasant effluvia. Complaints of this have been received from time to time.

DESTRUCTION OF REFUSE.

The provision of a refuse destructor for the city has been a clamant want for some years. Various reports have been prepared from time to time regarding its necessity, and sites have been suggested for its erection, but the proposals have fallen through, chiefly on account of the objections to the selected sites. These objections in earlier years were more or less warranted by the fact that the original forms of destructors were apt to be more or less of a nuisance to the residents in their vicinity. This was, for example, notably the case in Edinburgh. The makers of destructors have, however, profited by experience, and are now able to plan destructors that are free from nuisance. The chief cause of nuisance in the past was the incomplete combustion of the refuse, owing mainly to the absence of provision for forced draught, but partly, also, to defects in the construction of the furnaces. Imperfectly burnt refuse, when withdrawn from the destructors, often emitted offensive odours, and gave to destructors in general a somewhat bad reputation. The visit of a sub-committee of the Cleansing Committee in the autumn of last year to some of the more recently erected destructors dissipated any fears that might still have remained as to their freedom from nuisance. I was asked to accompany the deputation, and was able to join in the report, which stated that a properly constructed and well-managed destructor, dealing only with fresh refuse, is no more objectionable than almost any large industrial work where much furnace-stoking is necessary. Although in several of the towns visited, the destructors were in the immediate vicinity of dwelling-houses, and in some instances entirely surrounded by houses, the officials in charge were unanimous in stating that no nuisance arose from the destructors, and that no complaints had been received.

The Town Council are in course of promoting a Provisional Order for acquiring the grounds of the former St. Nicholas Poorhouse, and for erecting on them a refuse destructor sufficient to deal with the whole refuse of the city. There need, I believe, be no fear of the destructor being injurious to the health of the population in its neighbourhood.

The present deposition of refuse on a part of the Links is far from satisfactory, and is a frequent cause of complaint, even although the Inspector of Cleansing takes every reasonable precaution to prevent nuisance. The refuse, it is true, is being surfaced with earth and ashes to prevent odours arising, but the depth of the refuse is such that many years must elapse before the whole of the organic matter is dissipated, and the refuse is fully mineralised. The operation of destructors shows that such refuse loses about two-thirds of its weight on being burnt. This gives an indication of the large amount of organic matter that has to be got rid of by slow natural decomposition in unburnt refuse, although it has to be admitted that such part of the combustible matter as consists of cinders or coke will undergo practically no change, and will produce no offensive effluvia.

CITY HOSPITAL.

(Table XVIII.).

The extension of the Hospital referred to in the preceding annual report was begun early in 1909, the plans having been previously approved by the Local Government Board. The extension provides 58 additional beds for patients and 13 additional bedrooms for nurses, as also a much-wanted recreation room for the nurses. One of the pavilions has been constructed, in respect especially of windows and a verandah, so as to make it suitable for the treatment of consumptive patients on sanatorium lines.

The system of heating and ventilating the hospital has at the same time been altered. When extended in 1892, the wards were provided with a plenum system of ventilation and heating, air being driven by fans along underground ducts to the various wards and pavilions from a common fresh-air shaft at the administrative block, the air being heated by coils of hot-water pipes in the ducts. This system, as those familiar with it know, has the serious drawback of practically compelling all windows to be kept closed, if each ward is to obtain its calculated share of warmed air. In these days, when the heating of an hospital ward has become subordinated to its thorough ventilation, it is no longer possible to get the best results from hospital treatment without open windows. Accordingly, on the recommendation of the Public Health Committee, the Town Council resolved to discard the plenum system, and to substitute for it ventilation by open windows and heating by small bore hot-water pipes and radiators working on the Cable system. Heat will be obtained for the whole buildings from central boilers at the disinfecting station and laundry, and will be conveyed in the form of steam to each pavilion and to the administrative blocks. At each pavilion the steam will heat the water for the radiators, and the circulation of the water will be promoted by a self-acting pump or co-called syphoniser, which constitutes the special feature of the Cable system.

The number of cases admitted to the Hospital during the year was 1,179, as against 1,346 in the preceding year, and an average of 701 for the preceding ten years.

The accompanying table gives a summary of all the cases admitted, together with a corresponding summary for each of the previous ten years. As usual, the bulk of the patients were suffering from scarlet fever, but there was also a large number of cases of diphtheria.

TABLE XVIII.

CITY HOSPITAL—ANNUAL SUMMARY, 1909.
ADMISSIONS AND DEATHS DURING EACH YEAR FROM 1899 TO 1909 INCLUSIVE.

DISEASE.		1909	1908	1907	1906	1905	1904	1903	1902	1901	1900	1899	1899-1908.	
													Total.	Annual Average.
Smallpox,....	Admitted,	0	0	1	0	0	3	0	0	7	0	2	13	1'3
	Died,	0	0	0	0	0	0	0	0	1	0	0	1	0'1
	Percent. of Deaths to Admissions,...	0	0	0	0	0	0	0	0	14'3	0	0	...	7'7
Scarlet Fever,.....	Admitted,	871	1005	448	140	185	534	408	278	340	280	343	3961	396'1
	Died,	7	15	4	5	7	16	9	8	5	7	16	92	9'2
	Percent. of Deaths to Admissions,...	0'8	1'5	0'9	3'6	3'8	3'0	2'2	2'9	1'5	2'5	4'7	...	2'3
Diphtheria,...	Admitted,	244	239	174	192	127	131	120	107	101	82	78	1351	135'1
	Died,	22	15	14	17	7	9	8	8	5	6	8	97	9'7
	Percent. of Deaths to Admissions,...	9'0	6'3	8'0	8'9	5'5	6'9	6'7	7'5	4'9	7'3	10'3	...	7'2
Typhoid Fever,.....	Admitted,	28	10	17	9	13	24	22	28	70	26	35	254	25'4
	Died,	2	0	4	0	3	2	0	1	1	2	6	19	1'9
	Percent. of Deaths to Admissions,...	7'1	0	23'5	0	23'1	8'3	0	3'6	1'4	7'7	17'1	...	7'5
Typhus Fever,.....	Admitted,	0	0	0	0	97	22	0	0	0	0	5	124	12'4
	Died,	0	0	0	0	12	1	0	0	0	0	0	13	1'3
	Percent. of Deaths to Admissions,...	0	0	0	0	12'4	4'5	0	0	0	0	0	...	10'5
Measles,	Admitted,	7	36	30	50	6	72	78	156	133	342	191	1094	109'4
	Died,	1	1	11	3	0	1	9	3	4	9	4	45	4'5
	Percent. of Deaths to Admissions,...	14'3	2'8	36'7	6'0	0	1'4	11'5	1'9	3'0	2'6	2'1	...	4'1
Other Zymotics,	Admitted,	30	22	44	17	12	29	17	32	18	14	10	215	21'5
	Died,	8	3	9	0	2	4	2	3	1	2	1	27	2'7
	Percent. of Deaths to Admissions,...	26'7	13'6	20'5	0	16'7	13'8	11'8	9'4	5'6	14'3	10'0	...	12'6
Total Zymotics,	Admitted,	1180	1312	714	408	440	815	645	601	669	744	664	7012	701'2
	Died,	40	34	42	25	31	33	28	23	17	26	35	294	29'4
	Percent. of Deaths to Admissions,...	3'4	2'6	5'9	6'1	7'0	4'0	4'3	3'8	2'5	3'5	5'3	...	4'2
Quarantine,...	Admitted,	34	34	20	37	181	25	14	6	43	18	22	400	40'0
	Died,	6	7	5	6	6	3	3	0	0	0	0	30	3'0
	Percent. of Deaths to Admissions,...	17'6	20'6	25'0	16'2	3'3	12'0	21'4	0	0	0	0	...	7'5

In all, 871 cases of *scarlet fever* were admitted. The case-mortality was only 0.8 per cent, and is the lowest on record since the hospital was opened. It was, however, nearly as low in 1907, with 0.9. In 1908, it was 1.5 per cent. The average for the ten years ending 1908 was 2.3.

As I have remarked in an earlier part of the report, scarlet fever has now become so mild that it seems scarcely necessary, so long as the mildness obtains, to continue to remove so large a proportion of cases to hospital; although there is little doubt that the low death-rate among the removed cases is in part due to the advantages of hospital treatment. Among the cases treated at home, and not removed to hospital, the case-mortality last year was 2.5 per cent., or about three times as high as among the hospital-treated cases. If the comparison is extended over the past ten years, the case-mortality among home-treated cases will be found to be 4.4, as against 2.3 per cent. for the hospital-treated cases—or about twice as high. Possibly, however, the higher home mortality may be affected by a reluctance in some households to allow the more serious cases to leave home and go to hospital. But this may be balanced by the fact that such reluctance has usually no effect in the smaller houses, where home isolation is often impracticable, and it is among the poorer classes that the highest case-mortality is found.

Diphtheria accounted for 244 cases—the largest number since the erection of the hospital, and approached only by the number (239) for the preceding year. The average for the ten years preceding 1908 was only 119. The case-mortality was somewhat high, being 9.0 per cent. In the previous year it was 6.3. Here, again, the mortality was considerably higher than among home-treated cases, for whom the case-mortality last year was 28 per cent., or about three times as high as among the hospital-treated cases. One has only to observe the assiduous attention and care of the nurses in a serious case in hospital, and the frequent need of the Medical Resident's services, to realise that such a case would have a much smaller chance of recovery in a small and poor home.

As usual, a large proportion of the fatal cases died shortly after admission, having been sent to the hospital after the symptoms had become dangerous. Out of a total of 22 deaths, 14 took place within 24 hours from the time of admission. In 33 out of the total (244) cases treated, tracheotomy was found to be necessary on the admission of the patient, and succeeded in saving life in 21 cases. The average age of those who succumbed after tracheotomy was under 2 years. In only two deaths was the patient above 2 years.

In only about 10 per cent. of all the diphtheria cases admitted to hospital had antitoxin been administered before admission. Antitoxin is of greatest value when administered within the first one or two days of the illness, and it is to be regretted that it is not more readily resorted to by the medical attendant, even although he is not certain about his diagnosis. It does no harm in a doubtful case, and may save life if given early in a genuine case.

Typhoid Fever contributed 28 cases to the hospital during the year. There were only 2 deaths. In the preceding year, there were 10 cases, with no deaths. In every case, in addition to the Widal agglutinative test, the blood, urine, and stools were examined for the bacillus of typhoid, and no case was discharged from hospital until the urine and stools were found to be free from the bacillus after two successive examinations.

In two cases—a man and a boy—in which the bacillus continued in the stools, in one case for eight weeks, and in the other for ten weeks, from the commencement of the illness, the cases were treated with calomel for a lengthened period without effect. Based on knowledge derived from an investigation that I made some years ago into the action of saline cathartics, I made use of the following method for the purpose of combining, with the action of a disinfectant, a powerful flushing out of the intestines, and the attached excretory organs, such as the liver and gall bladder, in which the bacilli of typhoid are usually found in cases of so-called carriers. I accomplished the flushing by administering a highly concentrated solution of magnesium sulphate (one part of the salt in one of water) after a short period of abstinence from fluids. A large secretory and excretory flow from the walls of the intestines, as also from the liver and gall bladder, was thus induced with the object of washing out the bacilli into the cavity of the intestines. A full dose of one ounce of the salt was given in the case of the man. The saline solution was given on a fasting stomach in the morning, no food or fluids having been allowed since early in the previous evening, and none for two hours after administration of the salt. In the afternoon 6 grains of calomel were administered as a germicide for the bacilli that might remain within the intestines. For the boy half the quantities were prescribed. The purgation was profuse, and without much discomfort. The treatment was repeated after three days. The stools were examined bacteriologically after three days from the second treatment, and again after seven days more. At both examinations, in both cases, the examination revealed no typhoid bacilli. Examinations made some months later showed the stools still to be free from the bacilli.

Two cases are too few to warrant any decisive conclusion, but the results would appear to justify further trial of the method described.

If any such method is to be useful, it must be tried so soon as the case is seen to be drifting into the condition of a chronic carrier, and before the patient is released from isolation. I am doubtful of the benefit of any disinfectant and purgative method if the bacilli have been lodged for many months or years in the gall bladder, and have in part become embedded in its walls or in gall stones.

So hopeless usually has been medicinal or disinfectant treatment that the aid of the surgeon has been invoked to cut open the gall bladder and wash out the bacilli. This has occasionally proved successful, but the operation is too serious to become a matter of routine. In a few cases a vaccine treatment has been tried, and apparently, in certain of the cases, with success. Quite recently the Bulgarian sour-milk treatment, which is so much in vogue for digestive ailments, has been advocated as useful in typhoid carriers.

As yet, however, almost everywhere health officers have been obliged merely to note carrier cases when discovered, but have been unable to deprive them of their infectivity.

No cases of *typhus fever* or *smallpox* were admitted.

In all, 7 cases of *measles* were treated in hospital during the year. The average for the preceding ten years was 109. The small number admitted last year was mainly due to the difficulty in finding accommodation for cases of measles, arising from the alterations and extensions of the hospital buildings that were being carried on during the whole of the year.

Of the 18 cases of *epidemic cerebro-spinal meningitis* occurring in the city during the year, 15 were removed to the City Hospital for treatment. Two died before there was time to have them removed, and one, that had been taken to the Royal Infirmary upon another diagnosis, died there. Particulars of the cases admitted to the hospital have been given in an earlier part of the report. Six of them died, and the remainder made a good recovery.

Among other zymotic cases treated in the hospital there were 12 of *erysipelas*, 1 of *puerperal fever*, 2 of *whooping cough*, and 1 of *chicken pox*.

MATTHEW HAY, M.D.,
Medical Officer of Health.

ABERDEEN, 30th Dec., 1910.

APPENDIX.

NOTES ON TUBERCULOSIS IN ABERDEEN.

For some years I have been collecting information regarding the conditions of the prevalence of tuberculosis in Aberdeen. The information has been largely obtained by visits to affected households, in which I have received much assistance from the Sanitary staff, and especially from Dr. R. H. Watson, now in Cornwall; to all of whom I have to express my great indebtedness.

There is, perhaps, no disease in this country which is so widely spread and which manifests itself in so many forms. Its best-known form is pulmonary phthisis or consumption, but tubercle frequently affects lymphatic glands, joints, bones, the brain, and the bowels. Scarcely any organ or tissue is exempt from attack. Last year (1909) there were in Aberdeen 181 deaths from pulmonary phthisis, and 89 deaths from other forms of tuberculosis. It is calculated that for every death from phthisis there are at least five living persons suffering from definite phthisis. Few, if any, estimates have been made of the number of living persons suffering from other forms of tubercle, but they are probably twice or three times as numerous as those suffering from phthisis. Indeed, if we are to accept the opinion of several eminent Continental pathologists—an opinion based on many hundreds of autopsies—practically no person of adult age is free from a trace of tubercle, although in the vast majority of cases its presence has caused little inconvenience and has not been suspected. The estimates I have given refer, however, only to clinically recognisable cases of tuberculous disease.

The death-rate from tuberculosis is not necessarily a true index of the prevalence of the disease. It is highly probable that, like certain other zymotics, such as scarlet fever, the case-mortality in tuberculosis—the proportion of deaths among infected persons—may vary, and even vary greatly, without any corresponding fluctuation in the real prevalence of the disease. Thus, the great reduction in deaths from tuberculosis in recent times may, as is certainly true of scarlet fever, be due more to a diminished case-mortality than to lessened prevalence. If the eminent pathologists to whose opinion I have referred are right, this is the only possible view.

Be that as it may, it is of interest to us to know the incidence of the mortality from tuberculosis in our own city, and the changes that it has undergone since the civil registration of deaths, instituted in 1855, supplied us with the means of obtaining exact information.

Table I. (see also Diagrams A and B) gives the death-rate from (a) phthisis, (b) other forms of tubercle, and (c) all forms of tubercle, for every quinquennium up to the year 1905, and for individual years after that date to 1909.

The rates for males and females are distinguished.

A correction has been made for the deaths occurring in Kingseat Asylum and Oldmill Poorhouse since the removal of these parochial institutions outside the city

TABLE I.—ABERDEEN.—MORTALITY FROM TUBERCULOSIS 1856-1909.

Per 100,000 of Population.

(Calculated on Population as estimated by Registrar-General, with corrections for over-estimates since 1904.)

PERIOD.	PULMONARY TUBERCULOSIS.			OTHER TUBERCULOUS DISEASES.			ALL TUBERCULOUS DISEASES.		
	Males.	Females.	Both Sexes.	Males.	Females.	Both Sexes.	Males.	Females.	Both Sexes.
1856-60 . . .	333	312	322	235	135	179	568	447	501
1861-65 . . .	267	279	274	158	103	128	425	382	402
1866-70 . . .	205	300	298	170	98	130	465	398	428
1871-75 . . .	234	250	243	129	89	107	363	339	350
1876-80 . . .	217	228	223	112	92	101	329	320	324
1881-85 . . .	189	216	204	90	62	74	279	278	278
1886-90 . . .	179	188	184	76	60	67	255	248	251
1891-95 . . .	179	183	181	83	62	72	262	245	253
1896-1900 . .	166	168	167	77	64	70	243	232	237
1901-05* . . .	142	133	137	78	61	68	220	194	205
1906*	115	137	127	91	55	72	206	192	199
1907*	120	108	114	79	60	69	199	168	183
1908*	128	95	110	78	46	60	206	141	170
1909*	109	106	108	61	46	53	170	132	161

*Corrected for transferred deaths.

in 1904 and 1907 respectively. The rates since 1904 are also corrected for deaths within Aberdeen hospitals of persons not belonging to the city. The last correction does not substantially affect the comparison of the later years with earlier years, although it tends to exaggerate slightly the apparent decline.

The rates since 1904 are calculated, not on the Registrar-General's estimate of the population of the city, but on an estimate made from the number of inhabited houses. As is generally known, the population since about 1904 has not been growing so rapidly as in the preceding twenty years, and it is at present considerably overestimated by the Registrar-General. The death-rates given in the table for the years since 1904 are, therefore, higher than they would be if the Registrar-General's estimates had been used, but they are more correct.

The table shows that since the quinquennial period 1856-60 the death-rate from pulmonary phthisis has fallen from 322 per 100,000 of the population to 108 in 1909, or to almost *one-third* of what it was fifty years ago.

The death-rate from other forms of tuberculous disease has fallen even more, namely, from 179 per 100,000 of population, in 1856-60, to 53 in 1909.

In other words, if the death-rate for tuberculous diseases in 1909 had been as high as in 1856-60, the total number of deaths from phthisis would have been 517 in place of 181, and from other forms of tuberculosis it would have been 299 instead of 89. Or taking all forms together, there would have been 816 deaths from tuberculosis in place of 270.

In Scotland, as a whole, the decline has not been quite so great. The fall between 1856-60 and 1909 was, for phthisis, from 253 to 118 per 100,000 of the population, or less than one-half; while for other forms of tuberculosis the rate declined from 105 to 72, or to rather more than two-thirds of its former height.

The fall has, however, been nearly everywhere greater in the towns than in the country as a whole, or in rural districts.

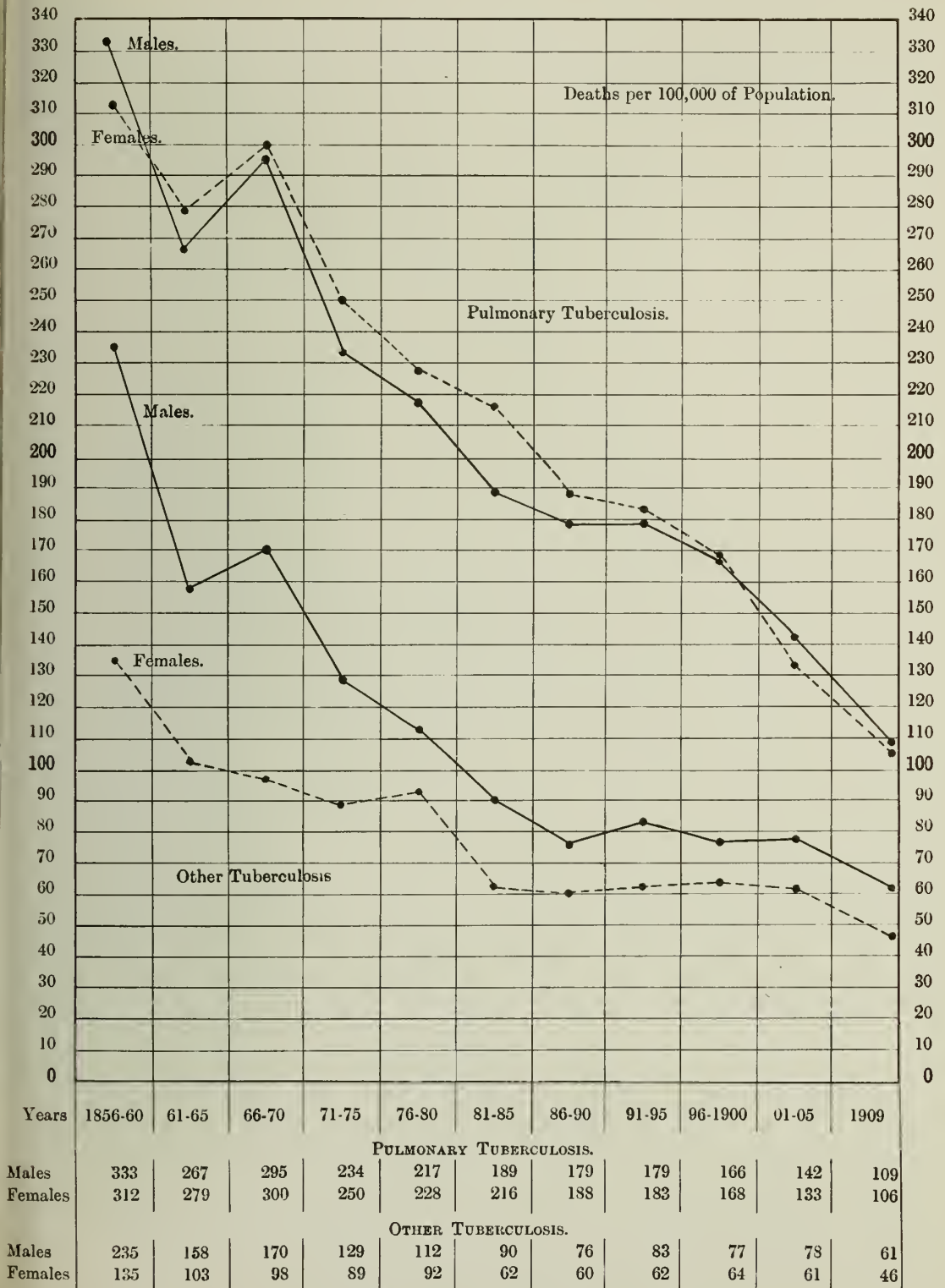
It is noteworthy that the decline in the death-rate from tuberculous diseases has been greater than the decline in the death-rate from all other causes. Since 1856-60, in Aberdeen, the fall in the former has been 68 per cent., while in the latter it has been only 34 per cent., thus showing that, whatever may have been the causes making for a reduction in the general death-rate of the city, they have had a much greater influence on tuberculous disease than on other forms of disease. This is also true of the country generally.

Other large towns in Scotland also show a great decline in the mortality from tuberculosis, but scarcely so great as in Aberdeen. In Table II. the rates are given for six principal towns, for purposes of comparison. The rates for 1856-60 and 1881-5 are calculated from the Registrar-General's reports, while the rates for 1909 are from the Report of the Local Government Board. In the latter report correction has been made for institutional deaths—all such deaths having been transferred to the records of the district in which the deceased ordinarily resided. The population on which the rates for 1909 are calculated by the Local Government Board is in each case that estimated by the Registrar-General. I have already stated that the estimate of the Registrar-General for Aberdeen in 1909 gives a population that is considerably wide of the mark. The same is true of several other large towns. I have, therefore, with the help of information from these other towns as to the rate of increase of their inhabited houses, made estimates of my own on the same basis

DIAGRAM A.

ABERDEEN.—TUBERCULOSIS, 1856-1909.—QUINQUENNIAL PERIODS.

ALL AGES. MALES AND FEMALES.

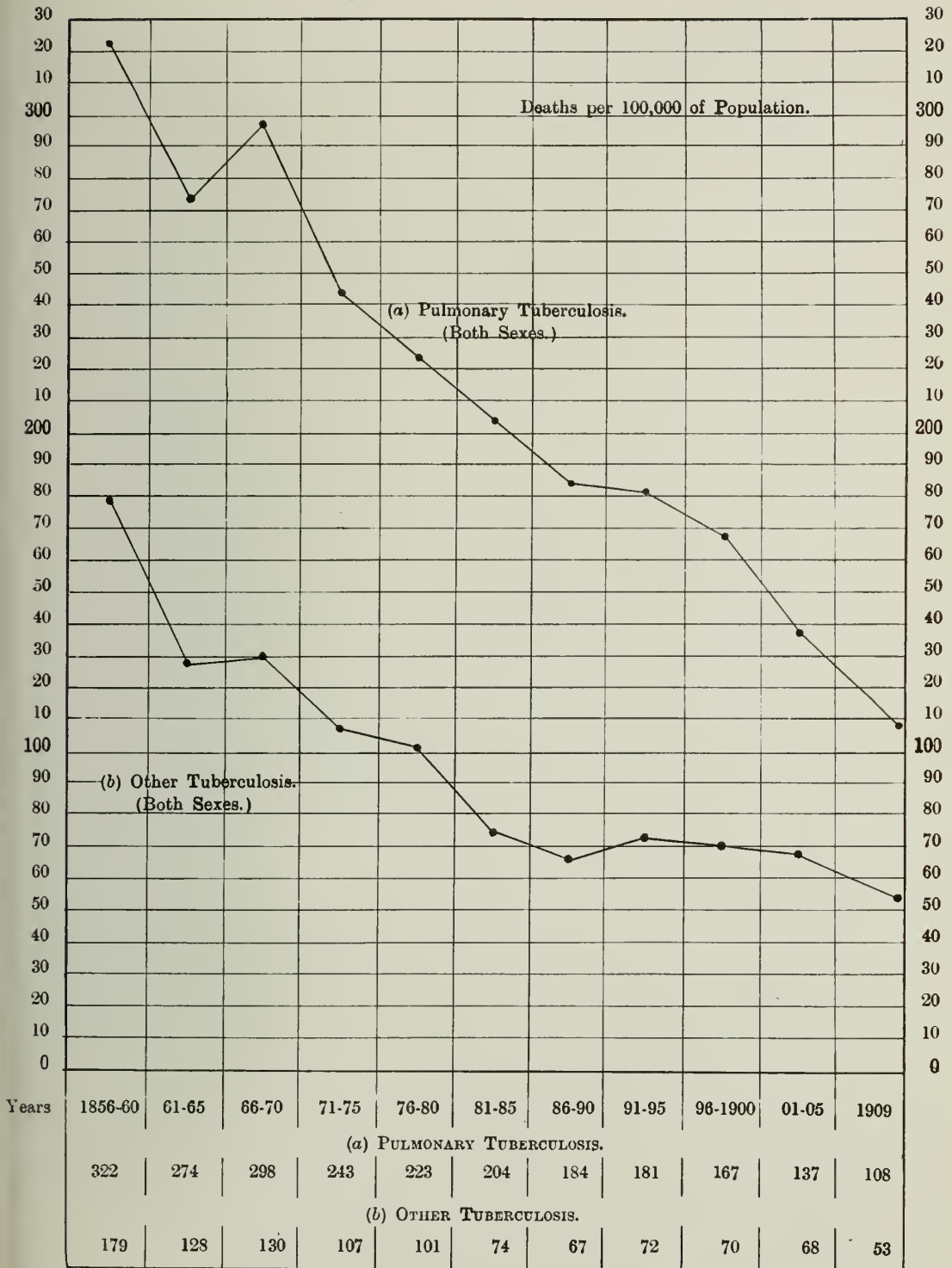


(Corrected for transferred deaths since 1901. Population based on estimates by Reg. General, as corrected by Medical Officer of Health.)

DIAGRAM B.

ABERDEEN.—TUBERCULOSIS, 1856-1909.—QUINQUENNIAL PERIODS.

ALL AGES. BOTH SEXES.



Deaths per 100,000 of Population.

(Corrected for transferred deaths since 1901. Population based on estimates by Reg.-General, as corrected by Medical Officer of Health.)

TABLE II.—COMPARATIVE MORTALITY FROM TUBERCULOSIS AT ALL AGES IN
SEVEN PRINCIPAL TOWNS OF SCOTLAND.

(Per 100,000 of Population.)

Population in 1909 (in thousands)—	Glasgow.	Edin- burgh.	ABER- DEEN.	Dundee.	Paisley.	Leith.	Greenock	ALL SCOT- LAND.
(a) Estimated by Registrar-General	872.0	355.4	181.9	169.4	91.9	85.7	72.3	4,852.0
(b) Estimated from inhabited houses	(800.7)	(332.6)	(168.0)	(170.7)	(?)	(82.3)	(72.9)	...
DEATH-RATE—								
(a) Pulmonary Tuberculosis	1856-60 . 389	297	322	357	357	210	396	253
	1881-85 . 316	210	204	252	270	192	268	213
	1909* (a) 139	120	99	171	129	124	140	118
	(b) (152)	(128)	(108)	(170)	...	(129)	(139)	...
(b) Other Tuberculosis	1856-60 . 169	163	179	135	122	129	165	105
	1881-85 . 128	89	74	77	103	114	99	83
	1909* (a) 95	54	49	81	82	69	126	72
	(b) (103)	(58)	(53)	(81)	...	(72)	(125)	...
(c) All Tuberculosis	1856-60 . 558	460	501	492	479	339	561	358
	1881-85 . 444	299	278	329	373	306	367	296
	1909* (a) 234	174	148	252	211	193	266	190
	(b) (255)	(186)	(161)	(251)	...	(201)	(264)	...
RELATIVE DEATH-RATES AT SUCCESSIVE PERIODS, THE RATE FOR 1856-60 BEING TAKEN AS 100.								
(a) Pulmonary Tuberculosis	1856-60 100	100	100	100	100	100	100	100
	1881-85 81	71	63	71	76	91	68	84
	1909* (b) (39)	(43)	(34)	(48)	36	(61)	(35)	47
(b) Other Tuberculosis	1856-60 100	100	100	100	100	100	100	100
	1881-85 76	55	41	57	84	88	60	79
	1909* (b) (61)	(36)	(30)	(60)	67	(56)	(76)	69
(c) All Tuberculosis	1856-60 100	100	100	100	100	100	100	100
	1881-85 80	65	55	67	78	90	65	83
	1909* (b) (46)	(40)	(32)	(51)	44	(59)	(47)	53

*Rates corrected for transferred deaths { (a) calculated on population as estimated by Registrar-General.
(b) calculated on increase of population as estimated from inhabited houses.

as that given for Aberdeen. The mortality rates derived from these estimates are given, in brackets, immediately beneath those taken from the Report of the Local Government Board.

The table shows that in 1909, on whatever basis calculated, the mortality rate, both from pulmonary tuberculosis and from other forms of tuberculosis, was appreciably lower in Aberdeen than in any other of the large towns. Calculated on the most accurate basis, the rate from phthisis in Aberdeen was 108 per 100,000 of population; in Edinburgh, 128; in Paisley and Leith, 129; in Greenock, 139; in Glasgow, 152; and in Dundee, 170. For forms of tuberculosis other than phthisis, the rate in Aberdeen was 53; in Edinburgh, 58; in Leith, 72; in Dundee, 81; in Paisley, 82; in Glasgow, 103; and in Greenock, 125.

In respect also of the extent of the decline of the tuberculous death-rate since 1856-60, Aberdeen leads, with a drop of 68 per cent. in all forms of tuberculosis. Edinburgh comes next with 60 per cent. Then follow Paisley, with 56 per cent.; Glasgow, with 54; Greenock, with 53; Dundee, with 49; and Leith, with 40 per cent.

It is of interest to note that the decline in the mortality from tuberculosis was very considerable in practically every town between 1855-60 and 1881-5, and in several towns was almost as great as in the subsequent period of nearly equal length between 1885 and 1909.

The causes of the reduction of the death-rate from tuberculosis have, therefore, been in active operation almost everywhere for a long series of years.

Mortality in Relation to Sex and Age.—If the effect of sex alone be first considered, it will be seen from Table I. and Diagram A that, in Aberdeen, the death-rate at all ages from pulmonary tuberculosis among females fell a little more slowly than among males up to 1881-5, but since that time has declined a little more rapidly. Up to 1896-1900 the rate among females was slightly higher than among males; since 1900 it has, as a rule, been very slightly lower.

As to other forms of tuberculosis, the rate of fall up to 1876-80 was distinctly greater among males than females, but since that time it has been about equal in both.

In 1909, in Aberdeen, the death-rate from pulmonary tuberculosis at all ages was practically the same for both sexes. In many towns elsewhere it is distinctly lower among females than males. The death-rate from other forms of tuberculosis is in Aberdeen—as almost everywhere—considerably lower among females than males. This is mainly owing to a difference between the sexes in the incidence of tuberculous meningitis.

As to the effect of age alone, apart from sex, it may be of interest, in the first place, to look at Table III., which gives the average yearly number of deaths from tuberculosis during the five years, 1905-9, at several age-periods, as also the number of deaths from all causes at the same periods, so as to show the proportion of tuberculous deaths among deaths from all causes at different ages. It will be observed that the proportion varies from 1 per cent. at ages above 60 years to 7 per cent. at ages under 5 years, 20 per cent. at 25-60 years, 37 per cent. at 5-15 years, and 48 per cent. at 15-25 years.

In other words, during 1905-9 every second death at the age of adolescence was due to tubercle, chiefly phthisis, every third death at the "school" age, and every

TABLE III.—ABERDEEN.—PROPORTION OF DEATHS FROM TUBERCULOSIS TO DEATHS
FROM ALL CAUSES AT VARIOUS AGE-PERIODS.

(FOR FIVE YEARS—1905-1909.)

(Corrected for transferred deaths.)

AGE-PERIOD. (YEARS.)	AVERAGE YEARLY NUMBER OF DEATHS.				Percentage of Tuberculous Deaths to Deaths from All Causes.
	ALL CAUSES.	Tuberculous Disease.			
		Phthisis.	Other.	All.	
0—5	874	7	57	64	7
5—15	103	13	25	38	37
15—25	119	49	8	57	48
25—60	635	116	13	129	20
60 and upwards .	837	9	1	10	1
ALL AGES .	2,568	194	104	298	12

DIAGRAM SHOWING (TO SCALE) DEATHS FROM ALL CAUSES AT EACH AGE-PERIOD, WITH DEATHS
(DARK PORTION) FROM ALL TUBERCULOSIS.

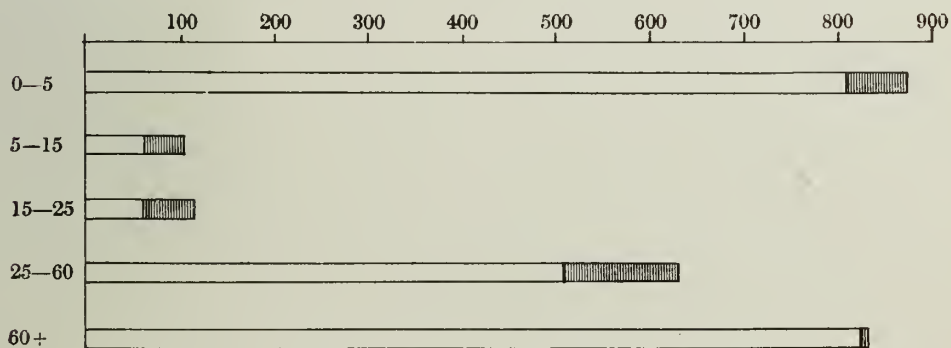
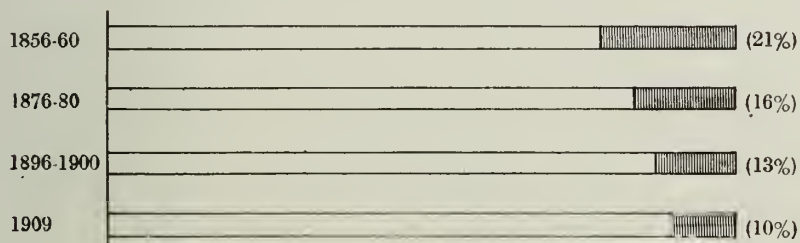




TABLE IV.—ABERDEEN.—PROPORTION OF DEATHS FROM TUBERCULOSIS TO DEATHS
FROM ALL CAUSES AT ALL AGES (1856-60 to 1909).

YEARS.	Population.	Average Yearly Number of Deaths.				No. of Tuberculous Deaths in every 100 Deaths from All Causes.		
		All Causes.	Tuberculous Diseases.			Phthisis.	Other Tuberculosis.	All Tuberculosis.
			Phthisis.	Other.	All.			
1856-60	73,457	1,772	235	130	365	13	8	21
1876-80	100,419	2,100	224	102	326	11	5	16
1896-1900	145,740	2,644	244	103	347	9	4	13
1909	168,000	2,675	181	89	270	7	3	10

DIAGRAM SHOWING (TO SCALE) DIMINISHING PROPORTION OF TUBERCULOUS DEATHS (DARK PORTION)
TO DEATHS FROM ALL CAUSES.



fifth death at the "mature" age-period. There can scarcely be any doubt that this does not represent the full effect of tuberculosis, and that several deaths attributed to other causes were in part due to tubercle.

These proportions were formerly much higher. In 1856-60 (see Table IV.), the proportion of tuberculous deaths at all ages to the total deaths was 21 per cent. In 1876-80, it was 16 per cent.; in 1896-1900, 13 per cent.; and in 1909, only 10 per cent.

Table V. and Diagram C show the death-rate in Aberdeen from tuberculosis at the principal age-periods, and the changes that have occurred since 1866-70. The rates in that quinquennium are contrasted with those in 1886-90 and in 1909. Diagram D is applicable solely to 1909, and shows not only the total death-rate from tuberculosis at each age-period, but also the proportions due to pulmonary tuberculosis and to other forms of tuberculosis, respectively.

It will be observed, to begin with, that the age-period at which tuberculosis exacts the highest death toll is the infant age-period of 0-5 years, but it is chiefly in deaths from tuberculosis in other forms than pulmonary phthisis, such as tuberculous meningitis, tuberculous peritonitis, and bone and joint disease. In recent years the age-period of 25-60 years comes next, but here the tuberculous deaths are, with few exceptions, caused by pulmonary tuberculosis. The age-periods that suffer least are the "school" age-period and the "post-mature" period (60 years and upwards).

At the infant age-period (0-5 years), it is mainly between the ages of 3 months and 3 years that the high mortality from tuberculosis occurs. During the ten years ending 1909, the average annual number of deaths from tuberculosis during the first year of life was 24; during the second year, 19; and during the third year, 13. In the fourth and fifth years of life it dropped to 7 and 6 respectively. In this regard tuberculosis is not different from certain other zymotics—notably measles and whooping cough. Reference will again be made to this in connection with infant feeding and bovine infection.

If we now turn to the changes in the incidence of the death-rate from tuberculosis at the various age-periods, it will be found for all tuberculosis and both sexes (see especially Diagram C) that the fall between 1866-70 and 1909 has been greatest at the age of adolescence (15-25 years), with a drop of 73 per cent., and least at the "mature" age-period (25-60 years), with a decline of 53 per cent. At the other age-periods it has been 63 to 65 per cent.

The decline has taken place at a very varying rate of rapidity for each age-period. At the "infant" age-period (0-5), almost the whole fall occurred in the first half of the period between 1870 and 1909. The fall since has been very small. This is also true, but in less degree, of the "school" age-period and of the "post-mature" age-period. But at the "adolescent" period the fall has been distinctly greater in the later than in the earlier half. At the "mature" age-period (25-60 years) the fall was somewhat greater in the earlier than the later half.

I am not certain, however, that the diminished rate of fall, in the more recent years, at the "infant" and "school" age-periods is quite correctly represented by the figures. It is at these periods that deaths from forms of tuberculosis other than phthisis bulk most largely; and it is well known among medical men that in recent years several deaths that would formerly have been attributed to other causes than tubercle are now set down to tubercle—*e.g.*, caries of bones, joint disease.

If cow's milk be an important source of tuberculous disease in children, the great

TABLE V.—ABERDEEN.—TUBERCULOSIS—MORTALITY AT VARIOUS AGE-PERIODS.
PER 100,000 OF POPULATION AT EACH AGE-PERIOD.

	Age (Years)	PULMONARY TUBERCULOSIS.						OTHER TUBERCULOSIS.						ALL TUBERCULOSIS.					
		0-5	5-15	15-25	25-60	60+	All Ages.	0-5	5-15	15-25	25-60	60+	All Ages.	0-5	5-15	15-25	25-60	60+	All Ages.
Average for Five Years, 1866-70	Male .	156	108	453	414	250	295	755	151	45	16	9	170	911	259	498	430	259	465
	Female .	147	130	428	402	179	300	607	78	11	12	9	98	754	208	439	414	188	398
	Both Sexes	151	119	439	407	205	298	681	115	26	14	9	130	832	234	465	421	214	428
Average for Five Years, 1886-90	Male .	44	43	258	290	185	179	332	60	20	19	6	76	376	103	278	309	191	255
	Female .	22	80	284	278	70	188	295	59	35	7	4	60	317	139	319	285	74	248
	Both Sexes	33	62	275	283	115	184	314	60	28	12	4	67	347	122	303	295	119	251
Year 1909* .	Male .	58	22	88	199	103	109	231	49	32	29	2	61	289	71	120	228	105	170
	Female .	58	39	112	164	51	106	240	55	16	11	0	46	298	94	128	175	51	152
	Both Sexes	58	30	101	180	71	108	236	52	23	19	8	53	294	82	124	199	79	161

*Rate corrected for transferred deaths, and population based on estimate by Medical Officer of Health.

DIAGRAM C.
ABERDEEN.—ALL TUBERCULOSIS. BOTH SEXES.

Deaths per 100,000 of Population at various Age-Periods in Years 1866-70, 1886-90, and in 1909,
showing progressive decline.

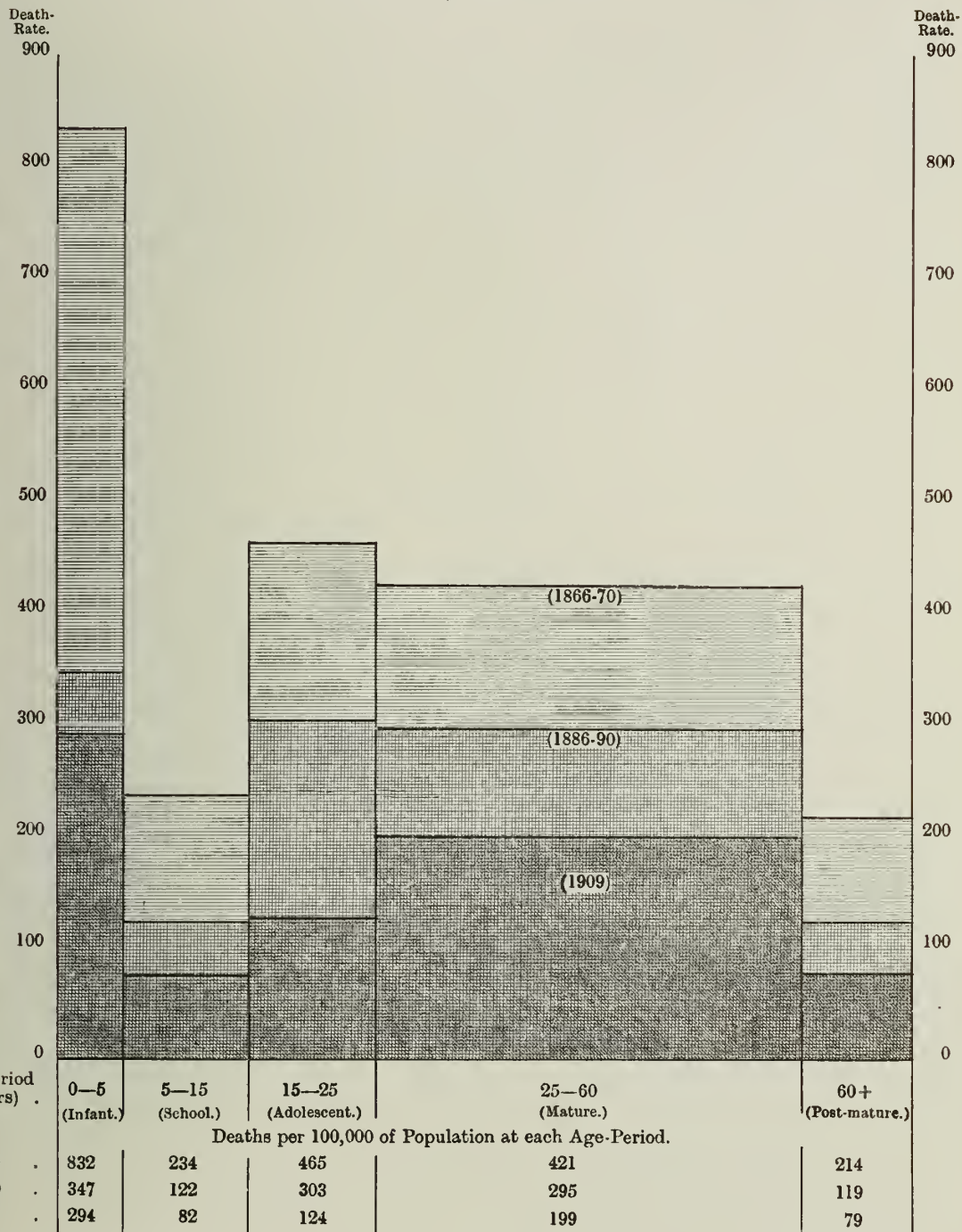
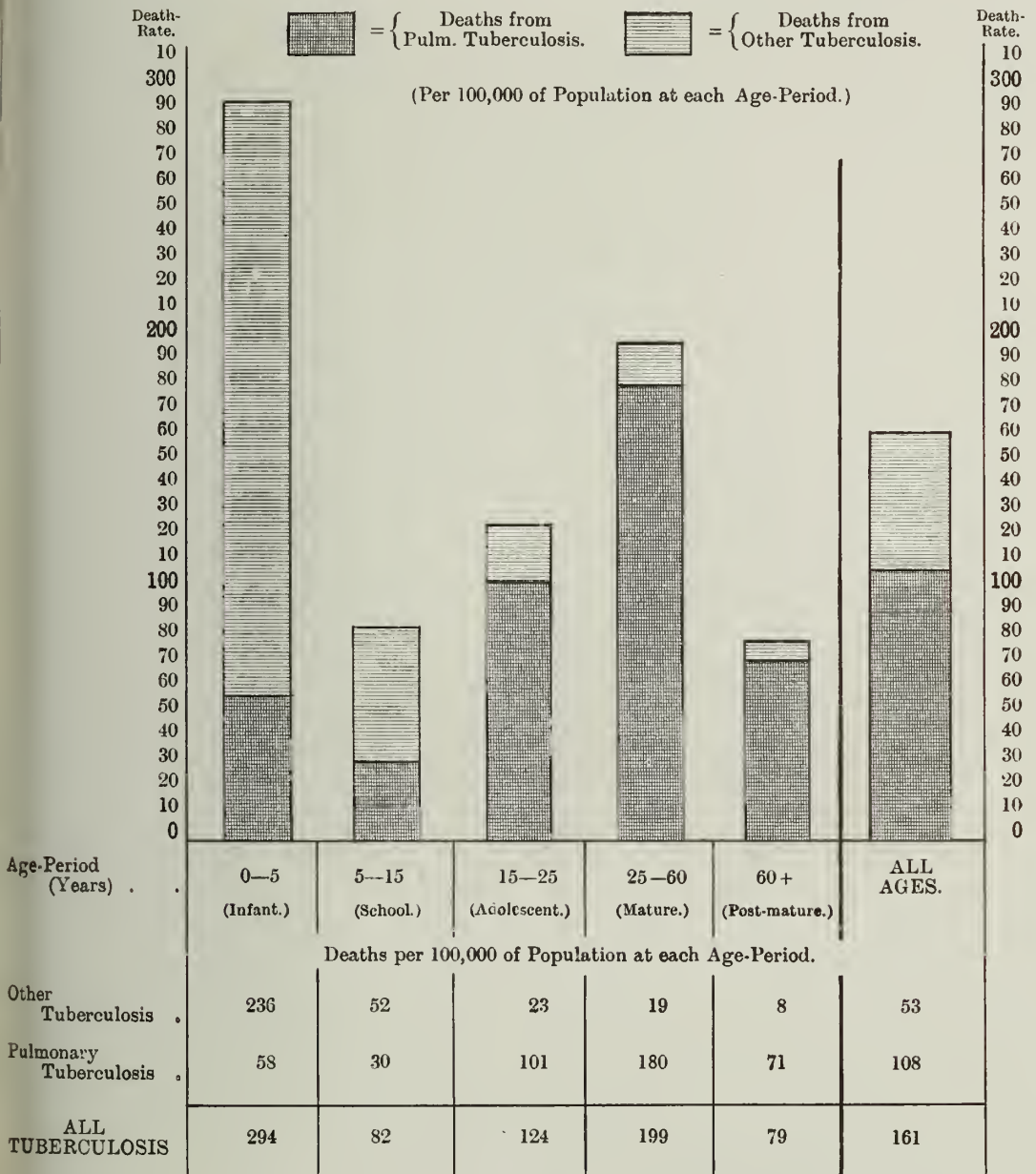




DIAGRAM D

ABERDEEN.—TUBERCULOSIS. MORTALITY AT VARIOUS AGE PERIODS.

YEAR 1909. BOTH SEXES.



(Corrected for transferred deaths. Population based on estimates by Medical Officer of Health.)

increase in the consumption of milk during the past thirty to forty years may in some degree have been counteracting in young persons influences that have been at work in lowering the mortality at other age-periods between 1890 and 1909; but it is difficult to understand how this could have so markedly affected the years between 1890 and 1909, and so little the years between 1870 and 1890. Moreover, concurrently with the later years, there has been a much stricter supervision of the milk-supply than in the earlier years.

As regards the relation of sex to the mortality at the various age-periods (see Table V.), it is of interest to note that, at the "school" age-period, girls have constantly suffered much more than boys from phthisis. In recent years nearly twice as many girls as boys have died from phthisis. Is this due in part to the larger amount of out-door play and exercise indulged in by boys? I think it not unlikely, in view of the well-established beneficial effect of open-air in preventing or arresting phthisis. At ages under five, boys tend to suffer more than girls from phthisis.

At the "adolescent" age-period, in 1866-70, more males than females died of phthisis; but in 1886-90, and still more in 1909, the excess of deaths among females is well marked.

During 1909, at the ages of 5 to 25 years—which cover the "school" and "adolescent" periods—for every two deaths from phthisis among males there were three among females.

At the age-period of 25-60 years the tables are turned, and men begin to die from phthisis more often than women. At ages above 60 years this difference continues, and in a very pronounced degree, so that, roughly, twice as many men as women at these ages die from phthisis. Probably the greater care that women can usually take of themselves in protection from chills and colds, and their greater freedom from the effects of alcoholism, partly accounts for their lower death-rate at the later ages. Men also suffer more from the deleterious effects of certain occupations. There is also the probability that if predisposition is an important factor, as I believe it to be, some males that have, for the reasons suggested, escaped death from phthisis in boyhood and adolescence may survive to increase the proportion of predisposed males at later ages.

As the total death-rate at all ages from phthisis is nearly equal for both sexes, and is, if anything, very slightly less for females than males, it follows that the higher mortality from phthisis in early life among females, although compensated for by a lower mortality in later years, produces a lower average age at death for all females dying from phthisis as compared with males.

Causes of the Decline in the Mortality from Tuberculosis.—If we knew these causes with some certainty we should naturally be much helped in our efforts to reduce the mortality still further.

As has already been pointed out, the decline has been going on in Aberdeen for at least fifty years, although it did not begin to be felt by Scotland as a whole until after 1870. It began earlier in towns than in rural districts.

It has not been due to changes in diagnosis and to the labelling, in recent years, as bronchitis or asthma, cases that would formerly have been diagnosed as phthisis. The death-rate from bronchitis has fallen almost *pari passu* with that from phthisis. At the same time I am convinced, from observation of the nature of the illnesses met

with in tuberculous families, that throughout the whole period of years under review, and right up to the present time, many cases of chronic phthisis have been wrongly spoken of as cases of bronchitis or asthmatic bronchitis. If there has been any change, it has rather been, by improved diagnosis, to transfer an increasing proportion of such cases to the tuberculous group, and thus to lessen rather than increase the apparent decline in pulmonary tuberculosis. This is also the effect of the increasing recognition of the causal part played by the tubercular micro-organism in the production of many suppurative diseases formerly attributed to other agencies.

The decline began long before the germ origin of tuberculosis had been demonstrated by Koch, although the infectious character of the disease had never been without believers; but, what is more remarkable, the rate of decline was almost as great before any administrative attention was being paid to its infective character as it has been after such attention began.

It is, therefore, plain that the ameliorating agencies have been of a general, and not of any specific, character.

Every-day experience shows that there is almost no disease so amenable as tuberculosis to general hygienic conditions. This is the secret of the benefits from sanatorium treatment. With liberal feeding, rest, and fresh air, almost every case of phthisis, except the most advanced, exhibits signs of improvement. In a sanatorium hygienic conditions are brought to a state of perfection; but during the last fifty years there has been a less perfect, but steadily progressive betterment of the sanitary and social conditions of the people as a whole. Housing is greatly better, so-called slums are greatly reduced, wages are substantially higher, food and clothes, as a whole, are cheaper, hours of labour are shorter, life in the workshop and the factory has benefited by legislation and inspection, and is more wholesome. School conditions are greatly better; and the medical and surgical treatment of tuberculous diseases has substantially improved. These are probably some of the chief factors in the reduction.

I am aware that at least one eminent medical authority attributes the fall almost entirely to the increasing segregation of consumptive cases in poorhouses, asylums, and infirmaries. I have collected the figures for Aberdeen, so far as obtainable, but I cannot persuade myself that they support this view, in regard, at least, to the remarkable declension in the first half of the last fifty years, and it is only reasonable to infer that the agencies at work in the earlier period have not ceased to be operative in the later period. It would, however, be scarcely possible to deny that, in more recent years, such segregation, although still very limited relatively to the number of tuberculous cases and the long duration of the illness, must have been exercising a beneficial influence.

It is, as I have already suggested, an interesting point whether the decline is due to a diminished prevalence of the disease, or merely to a lower mortality among the persons attacked.

Distribution of Tuberculosis in the City.—By this I refer to the distribution of deaths. I have prepared spot maps for several years showing the place of death of each fatal case of tuberculosis. Such maps are, however, difficult to reproduce on a scale suited for publication with these notes.

It is sufficient to say that the deaths are distributed with remarkable evenness

over all the working-class quarters of the city. It is, however, a notable feature that the distinctly better-class districts of the city, such as Queen's Cross and King's Gate districts show relatively very few deaths.

The newer part of Torry, although wholly composed of new houses of a good type, and mainly occupied by a fairly prosperous class of workmen, namely, those engaged in fishing and fishcuring, exhibits in certain parts a considerable proportion of tuberculous deaths. I have visited many of the families in Torry in which tuberculosis has occurred, and have found in several a strong family history of predisposition to tubercle. Possibly the tendency to in-marrying among fishermen may partly account for this predisposition.

I have not met with any well-marked example of the so-called tuberculous house, or the house that seems to remain infected after some earlier case of phthisis, and to continue to infect a series or a succession of tenants. There have been a few cases—amounting to 4 to 5 per cent. of the cases of phthisis investigated—in which there was a suspicion, or even a certainty, that a member of the immediately preceding tenant's family had suffered from tuberculosis; but the disease is so widespread that one must allow for a considerable percentage of accidental coincidences. The rarity of tuberculous houses in Aberdeen may be in some measure due to the Public Health Department having for several years disinfected practically every house in which a death from tuberculosis has occurred, and to the frequent disinfection of houses for all kinds of zymotic diseases, including measles and whooping cough. Many of the houses, especially those with young families, are thus disinfected once every two or three years.

The Department is also occasionally requested to disinfect a house after the change of residence of a family with a phthisical member. The number of such changes must be considerable, as is evident from an inquiry in 100 successive deaths from phthisis, as to the duration of residence of the deceased in the house in which the death had occurred. The results were:—

Under 6 months	.	.	.	.	.	.	21 cases.
6 months to 1 year	.	.	.	.	.	.	5 „
1 year to 2 years	.	.	.	.	.	.	17 „
2 years to 3 years	.	.	.	.	.	.	19 „
Above 3 years	.	.	.	.	.	.	38 „
							<hr/>
							100

Thus, in scarcely more than one-third of the cases had the length of residence been above three years—or beyond the period of duration of the large majority of fatal illnesses from phthisis.

In a few cases there had been several changes of residence at short intervals of six months to one or two years. In about three-fifths of all the cases no attempt had been made by the occupants, before removal, to disinfect the house.

It would be of great advantage if an arrangement could be made under which medical practitioners would inform the Health Department of every change of residence by a phthisical case; and it would only be fair that the Department should pay a fee for the information.

Relation of Size of House to Tuberculosis.—The size of a man's house, as measured by the number of its rooms, is a rough, although uncertain, measure of the extent of his means, or lack of means. In its bearing on the mortality from tuberculous disease, I have for two complete years obtained information as to the size of house in which each death from such disease occurred. In the case of institutional deaths, I have referred them to the size of house from which the deceased persons came. Where this was not known, the deaths have simply been omitted.

Thus classified, I find that on an average fully three-fourths of the whole deaths from phthisis occurred among the occupants of houses of three rooms and under (see Table VI.). The proportion of deaths from other tuberculous diseases in such houses is even somewhat larger. In relation to the population occupying houses of

TABLE VI.

ABERDEEN.—DEATHS FROM TUBERCULOSIS IN RELATION TO SIZE OF HOUSE.

AVERAGE ANNUAL NUMBER FOR 1907 AND 1908.

	NUMBER OF DEATHS AMONG PERSONS OCCUPYING HOUSES OF			
	1 and 2 Rooms.	3 Rooms.	4 Rooms.	5 Rooms & upwards
Phthisis	67	59	20	16
Other Tuberculosis	56	29	11	7
ALL TUBERCULOSIS	123	88	31	23
DEATHS PER 10,000 OF TOTAL POPULATION OCCUPYING HOUSES OF DIFFERENT SIZES.				
Phthisis	11	11	10	6
Other Tuberculosis	8	6	5	2
ALL TUBERCULOSIS	19	17	15	8

different sizes, the death-rate from tuberculous disease as a whole is more than twice as high in houses of four rooms and under as it is in houses of five rooms and upwards.

The problem of the control of tuberculosis relates, therefore, mainly to the occupants of smaller houses, and to the poorer classes.

Relation of Crowding to Tuberculosis.—The proportion of occupants to rooms in each house was ascertained, as well as the size of the house.

In only one or two instances was overcrowding met with, as measured by the standard followed in the City of Aberdeen—namely, a minimum of 400 cubic feet for each adult, and half for a child under eight years of age. The law against overcrowding is actively enforced by the Sanitary Inspector.

Contrary to expectation, it was not found that the proportion of tuberculous cases was greatest in the houses with the highest number of inmates to rooms, as based on the population in houses of different degrees of crowding, ascertainable from the census of 1901. Thus, among the section of the population occupying houses with two persons and above one person to each room, the death-rate from phthisis was 12 per 1,000, while among the section occupying houses with more than two persons to each room the death-rate was 5 per 1,000. On the other hand, in houses with one person and under to each room, the death rate was also 5 per 1,000.

These proportions are calculated on the deaths for two years. The years taken singly did not give substantially different results.

In some instances a family, in which a case of phthisis occurred, had removed to a larger house to allow of better separation of the patient; and this may account in part for the unexpected character of the proportions. But in many houses of three rooms there is often more overcrowding during the night than in two-roomed houses, owing to the frequent practice of reserving one of the rooms as a parlour, and crowding the family for sleeping purposes into the kitchen and a small bedroom, which sometimes opens from the parlour, and is not infrequently badly ventilated and unprovided with a fireplace as a help to ventilation. When tuberculosis invades a family, the largest rooms should be used for living and sleeping. It is almost criminal to leave unutilised what is sometimes the most airy and sunny room in the house.

Lighting of House.—This was also noted. In 74 per cent. the lighting was good, in 18 per cent. it was fair, and in 8 per cent. it was indifferent or bad—that is, the windows were too small, or there was some degree of obstruction to proper lighting on account of the proximity of other buildings. The standards on which this classification proceeded was fairly high, as we have no longer any houses in Aberdeen in which the lighting is grossly defective. All such houses, so far as known, have during the past thirty years been closed or demolished. Underground dwellings, which are often defective in lighting, have also been extensively dealt with during the same period.

Ventilation of House.—In noting the ventilation of houses, a distinction has to be made between the means of ventilation and the utilisation of the means.

As good ventilation is very important in the prevention and treatment of phthisis, its absence or presence was noted in all the cases inquired into. In an ordinary room the usual means of ventilation are the windows and the chimney of the fireplace.

In many of the older houses the sashes of the windows were found not to be hung, and were therefore difficult to open. Chiefly as the result of this inquiry, a vigorous campaign has been conducted for the past two or three years by the Sanitary Department against such windows wherever found, and it is hoped that shortly there will be few houses in Aberdeen with windows that cannot be conveniently and easily opened to their full extent. An unhung window is as much a nuisance in the sanitary sense as an untrapped drain, and equally requires to be dealt with.

For many years the Corporation has exercised its powers in approving the plans of new houses to disallow rooms without a fireplace, or a ventilating duct in lieu of a fireplace. But there is still a considerable number of old and moderately old houses with small rooms that have no fireplace or ventilating duct.

In not a few cases, phthysical patients were found to be occupying such rooms, and sometimes sleeping along with other members of the family.

With regard to the adequate use of the means of ventilation, it was disappointing to find that in not more than 5 per cent. of the phthysical cases investigated was there the thoroughly free ventilation of the room that is so desirable for proper treatment. Rarely were the sashes of a window found to be opened to their fullest extent.

It is difficult to persuade patients, and especially the relatives in charge, to risk the patient in a room with widely opened windows. But education in this is gradually and surely extending, although a few disappointing cases were met with, where even after a spell of treatment at a sanatorium the patient had relapsed to practically closed windows.

The medical attendant of a tuberculous patient is in large measure responsible for insisting upon the windows of rooms occupied by consumptives being kept widely open. Several of the medical men do insist upon this; but there are others who are less insistent, and whose instructions are not attended to.

A great difficulty in some cases is the underfed condition of the inmates of the house, rendering them sensitive to cold, as also the lack of sufficient body- and bed-clothing to provide the extra coverings that are necessary if ventilation is to be thorough.

It is difficult also in small houses, when the patient is not the sole occupant of the room, to persuade his fellow-occupants to agree to open windows. To obtain the full ventilation required by a consumptive, it is almost necessary for him to have a room to himself. In small houses this is often difficult, and even impossible.

Dampness of House.—In about 2 per cent. of the houses dampness was found. The proportion is small, but is probably considerably above the proportion in Aberdeen houses as a whole. Damp houses, it is well known, favour the development of consumption, probably by impairing the power of resistance.

Cleanliness of House.—The proportion of badly kept houses was not higher than among the houses of the city generally, and was distinctly lower than among the large number of houses recently visited in connection with an investigation of the causes of infantile mortality, the results of which were published in an appendix to my Annual Reports for 1907 and 1908.

Sanitary Conveniences.—There is scarcely any need for referring, in Aberdeen, to the presence or absence of ashpits in connection with houses occupied by phthysical patients, or to the provision of water-closets, as ashpits have for many years been abolished in this city, and, with very few exceptions, there is adequate water-closet accommodation for all houses. The drainage of practically every house—old as well as new—is of a modern type, landlords having expended large sums in the last thirty years, mostly at the instance of the Sanitary Department, in renewing or modernising the drainage of their properties.

Duration of Disease.—It is difficult to obtain precise information regarding the duration of cases of tuberculosis. Tuberculosis differs from most of the ordinary

zymotics in not pursuing a regular and quickly terminable course. Almost the only thing that is certain is that the course is rarely short, and that even in the mildest attacks, ending in recovery, the disease is not definitely arrested until after several months. Indeed, there are some who take the view that the disease, once established, seldom comes to a complete end, although affected persons may to all appearance be cured and never again exhibit active symptoms of tuberculosis. The disease has only become quiescent or latent, and, if affecting a very limited area of some organ, need produce no appreciable interference with health. It has therefore become customary to speak of the arrest rather than the cure of tuberculous cases. This is, however, a somewhat extreme view, although it conveys an element of truth.

Even in cases in which the symptoms are pronounced, and go on to death, it is difficult to estimate the duration of the disease, as the beginning is usually insidious, and the earlier manifestations may have for months or years been attributed to other causes than tubercle. In a case of phthisis the commencement of the illness is usually reckoned, by the patient and his friends, only from the time that the symptoms become unmistakable. The real duration of the disease is, therefore, usually understated, and sometimes is grossly understated.

With these qualifications, the accompanying table (Table VII.) is given, in which 301 fatal cases of phthisis occurring during the year 1907 and 1908 are classified according to their duration, as ascertained from the relatives. The duration varied from two or three months up to an almost indefinite number of years. Fully one-half of the cases died within 18 months of taking ill. On the other hand, 10 per cent. of the cases had lasted for more than five years.

It is certain that the proportion of cases lasting for more than five years is considerably in excess of this figure, if there is included the considerable number of mild chronic phthisical patients who are regarded as suffering from chronic or asthmatic bronchitis—sometimes for a long lifetime—and when they die are not certified as phthisical.

The table also takes no account of the not inconsiderable number of cases of non-pulmonary tuberculosis—such as disease of bones and joints and glands—that may last for many years.

The average duration of the 301 cases of phthisis tabulated was 2 years 2 months. The average duration of 95 cases investigated in 1905 was 2 years 3 months.

The duration is, however, considerably influenced by the age of the patient, as is shown in the table. As a rule the younger the person, the shorter the duration. Among persons under 15 years of age the average duration was only 9 months; among persons of 15-25 years—1 year 11 months; among persons of 25-40 years—2 years 6 months; among persons of 40-60 years—2 years 4 months; and among persons of 60 years and upwards—3 years.

The more rapid course of the disease in young persons indicates the necessity for prompt attention to early symptoms in such cases, with a view to early arrestive treatment.

Duration of Confinement to Bed.—In a series of 102 fatal cases of phthisis the duration of confinement to bed before death was ascertained. It varied considerably. In several cases it was only two to three weeks. It rarely extended beyond eight

TABLE VII.

ABERDEEN.—DURATION OF ILLNESS IN 301 FATAL CASES OF PULMONARY PHTHISIS—
YEARS 1907 AND 1908.

A.—Percentage of Deaths at each Period to Total Deaths.

DURATION.					MALES. (Per cent.)	FEMALES. (Per cent.)	BOTH SEXES. (Per cent.)	
Under 3 months	...	...	...	...	7	3	...	4
3—6	„	...	...	...	8	11	...	10
6—9	„	...	...	...	14	15	...	15
9—12	„	...	...	...	9	9	...	9
<hr/>								
Under 1 year	...	...	...	...	38	38	...	38
1—1½ years	...	...	...	...	15	17	...	16
1½—2	„	...	...	...	9	9	...	9
2—3	„	...	...	...	12	15	...	14
3—4	„	...	...	...	10	6	...	8
4—5	„	...	...	...	7	4	...	5
5—6	„	...	...	...	5	2	...	3
6—8	„	...	...	...	3	5	...	4
8 and upwards	...	...	...	...	1	4	...	3
					<u>100</u>	<u>100</u>	<u>100</u>	

B.—Average Duration of Illness in relation to Age at Death.

AGE AT DEATH. (Years.)					NO. OF DEATHS.		DURATION OF ILLNESS. Years. Months.	
Under 15	...	...	...	...	28	...	0	9
15—25	...	...	...	...	82	...	1	11
25—40	...	...	...	...	100	...	2	6
40—60	...	...	...	...	75	...	2	4
60+	...	...	...	...	16	...	3	0
<hr/>								
All Ages	...	...	...	...	301	...	2	2

to nine months, although in one case it was as long as three years. Omitting this exceptional case, the average length was 2 months 3 weeks.

Period off Work.—This varied greatly in different cases of phthisis. In some the deceased had been as long as three to five years off work. In the majority it extended from one to two months to a year.

Disclosure of Nature of Illness to Patients.—It is of interest in connection with the notification of cases of tuberculosis, and with the exercise of precautions by patients and their relatives, to know in what proportion of cases the true nature of the disease has been disclosed to the patient by the medical attendant.

There is admittedly a disinclination on the part of many medical men to disclose to a patient suffering from pulmonary tuberculosis the true nature of his illness, so long as there is hope of recovery. Consumption, in the minds of many persons, is always fatal, and the medical man, knowing that a cheerful and hopeful spirit is a great help to recovery, talks round the diagnosis.

This delicacy of feeling has, however, the great drawback that it often prevents instructions being given as to precautions against the spread of infection; or if they are given, without full disclosure of the reason, they are apt to receive very indifferent attention from the patient.

In about 300 deceased cases of phthisis in the city, inquiries were made at the relatives as to whether and how long before death the patient had been informed of the real cause of his illness; and it was found that, excluding young persons under 15 years of age, who are less likely, under any circumstances, to have the nature of their illness discussed with them, 49 per cent—or about one-half—of all persons dying of phthisis were never told the cause of their illness; and that among persons above 25 years of age the proportion was even greater than among persons between 15 and 25.

Only 25 per cent., or one-fourth, of all the cases above 15 years of age had been informed of the cause of their illness more than six months before death.

Health in Infancy.—The state of health in early childhood was ascertained in all the cases investigated, and it was found to have been bad or unsatisfactory in a large proportion of children who died from tuberculosis before they had reached their fifth year of life. Among such cases dying from phthisis, 75 per cent. had bad health in infancy; among cases of tuberculous meningitis, 33 per cent.; among cases of abdominal tuberculosis, 44 per cent; and among cases of other forms of tuberculosis, 64 per cent.

At higher ages, the proportions were mostly less. Among persons between the ages of 5 and 15 years dying from phthisis, the percentage with inferior health in infancy was 45; from tuberculous meningitis, 36; from abdominal tuberculosis, 9; and from other forms of tuberculosis, 27.

Among persons of 15 to 25 years dying from phthisis, the percentage was 24; and among persons of 25 to 40 it was 12. Above the age of 15 there are very few deaths from tuberculous meningitis and abdominal tuberculosis.

It is obvious that infants of weak health contribute a large proportion of the martyrs to fatal tuberculous disease in later childhood and in adolescence. It may

have been that the weak health was in some cases due to early tuberculous infection; but in many cases the infants appeared to have been weakly from birth.

Such weakly children require to be specially guarded against tuberculous infection. Unfortunately, in many instances there was reason to believe that one or other parent was tuberculous, so that there would have been great difficulty in carrying out precautions successfully.

SOURCES OF INFECTION.

(a) *Infant Feeding and Bovine Infection.*—Some authorities go so far as to assert that cow's milk is the chief source of tuberculosis in man, and that the infection is mostly got in infancy, but that the bacilli often remain dormant for many years, and proceed to vigorous growth only when the health of the person is lowered by illness or by the stresses of subsequent life.

This view is not generally accepted. For it is incompatible with the fact that in some districts, such as may be found in Japan, China, Turkey, and Greenland, where cow's milk is either not used, or is used only after being boiled, tuberculosis is as common as in ordinary milk-consuming countries. Indeed, in some of these countries the mortality from tuberculosis is much higher than in Great Britain, where the consumption of raw milk is universal.

Along with this fact, however, must be taken the finding of both the English and German Government Commissions on Tuberculosis, that the tubercle bacillus characteristic of bovine tubercle is met with in a considerable proportion of cases of abdominal tuberculosis and of tuberculous glands, although scarcely ever in pulmonary tuberculosis or in tuberculous meningitis.

The nature of the feeding—whether breast or bottle—in infancy of every person dying from tuberculosis in 1907 and 1908 in Aberdeen was, as far as possible, ascertained. The accompanying table (Table VIII.) gives the number of cases for each form of tuberculosis and at each age-period for which information was procurable. It shows an apparently high proportion of bottle-feeding among persons dying within the first five years of life. The proportion ranged from 31 per cent. in children dying from abdominal tuberculosis to 63 per cent. in children dying from phthisis—the average for all deaths at this age-period being 40 per cent.

In an inquiry into infantile mortality in Aberdeen which I carried out during the same years (1907 and 1908), and in which the character of the feeding of every child born during these years was ascertained, I found that 30 per cent. were bottle-fed, and that 70 per cent. were breast-fed in whole or in part.

Had cow's milk been the main source of tuberculosis among the children dying under five years of age, one would expect to have found the percentage of bottle-feeding to be very high among such children. It is higher than the average for all infants born in the city, but rather curiously, it is no higher among children dying from abdominal tuberculosis than among all infants born; but this may be due to the numbers dealt with not being sufficiently large to furnish reliable data.

Further, although in Aberdeen the proportion of bottle-fed infants among children born in houses of five rooms and upwards is nearly 50 per cent. as against about 25 per cent. among children born in one- and two-roomed houses, there were only two deaths from abdominal tuberculosis in the two years among the better-class chil-

TABLE VIII.—ABERDEEN.—TUBERCULOSIS AND BOTTLE-FEEDING.

DEATHS FROM TUBERCULOSIS, 1907 AND 1908.*

AGE.	PHTHISIS.		TUBERCULOUS MENINGITIS.		ABDOMINAL TUBERCULOSIS.		OTHER TUBERCULOSIS.		ALL TUBERCULOSIS.	
	No. of Cases Investigated.	Percentage Bottle-fed in Infancy.	No. of Cases Investigated.	Percentage Bottle-fed in Infancy.	No. of Cases Investigated.	Percentage Bottle-fed in Infancy.	No. of Cases Investigated.	Percentage Bottle-fed in Infancy.	No. of Cases Investigated.	Percentage Bottle-fed in Infancy.
Years.										
0-5	8	63	64	41	32	31	14	43	118	40
5-15	19	26	23	39	12	33	14	21	68	31
15-25	76	20	3	0	3	33	6	17	88	19
25-40	79	10	1	0	...	...	4	25	84	11
40-60	40	7	...	...	..	...	7	29	47	11
60+	8	0	...	...	...	...	2	0	10	0
All	230	...	91	...	47	...	47	...	415	...

*Includes only cases where definite information obtained as to feeding in infancy.

dren dying under five years of age. The milk is sterilised in only about one-half of bottle-fed children in the larger houses. It has also to be noted that I found in not a few instances the child had been bottle-fed merely because the mother was unable from weak health to undertake breast-feeding, and there was evidence in several cases that the mother's weakness was due to tuberculosis. The mother was, therefore, as likely as the milk to infect the child.

I personally visited a large proportion of the families in which a death from abdominal tuberculosis or tuberculous meningitis had occurred, and I found, on careful investigation, that in many instances tuberculous disease had been previously in the household, or that there was a family history of tubercle on the side of one or both parents. Thus, out of 34 cases of abdominal tuberculosis, the mother was either actually tuberculous or a tuberculous suspect in 24 cases, and the father in 5 other cases. I include among tuberculous suspects 15 mothers who were not declared consumptives but who each admitted that they suffered from chronic cough or winter cough—accompanied in 5 cases by a history of spitting of blood. In almost no family was there an absence of tuberculosis in the household or in the family history of the parents.

Similarly, among 58 cases of tuberculous meningitis minutely investigated, I found that the mother was tuberculous or was a tuberculous suspect in 32 cases, and the father in 6 additional cases. In 2 cases the father as well as the mother was a tuberculous suspect.

The great majority of the mothers believed to be tuberculous were not declared consumptives; but, in most cases, usually along with a family history of

tubercle, there were such symptoms or diseases as "pleurisy"—so often tuberculous; asthmatic bronchitis; white swelling of the knee; continuous ailing and weakness; kidney disease—also often of tuberculous origin, as has recently been shown; chronic cough; spitting of blood. In 45 out of the 58 cases of tuberculous meningitis, there was a family history of tuberculosis on the side of one or both parents.

These facts tend to prove the high probable prevalence of tuberculosis in the families of children dying from tubercle, and suggest that the main source of tuberculosis infection in children, as in adults, is human and not bovine.

In this connection I may state that during 1905 and 1906, and again in the present year, several samples of the milk supplies of the city were taken for examination for tubercle at the Bacteriological Department of the University. In each case the milk was tested by the inoculation of guinea-pigs. In all, 57 samples have been examined, 25 of which were tested during the current year. In one sample in 1905, tubercle was found, but none in 1906, or during the present year. This is very satisfactory, as it is not uncommon in large towns in the South to find evidence of tubercle in 5 to 15 per cent. of all the milk supplies.

The low proportion of tuberculous milks in Aberdeen is probably due to the large proportion of young cows in the herds of dairymen in and around the city, and to the practice of fattening off the cows after one season of milking. Young cows suffer less from tuberculosis than old cows, and especially from tuberculosis in the udder, which is naturally the chief source of tubercular infection in milk.

The high death-rate from tuberculosis in infancy (see Diagrams C and D) is by some authorities brought forward as proof of infection from milk. It may in part be due to milk infection, whether from the mother's milk or cow's milk, but there can scarcely be any doubt that tuberculosis offers, in this respect, only another illustration of what is now well known regarding certain other zymotics, notably measles and whooping cough. Some years ago I published supplements to my annual reports dealing in detail with the mortality from these very common zymotics, and showing how very high was the case-mortality for each during the first two to three years of life. It is impossible to obtain the case-mortality for tuberculous diseases, but I have tabulated the deaths in Aberdeen from measles, whooping cough, and tuberculosis for the first five years of life during the decennium 1900-9, and have represented the results in diagrammatic form (Diagram E).

The diagram shows a remarkable similarity between the three diseases, and suggests, I think, that the high mortality from tuberculosis in infancy—whatever be the source of the infection—is due to the same cause as the high mortality at the same period from measles and whooping cough—which are not milk-borne diseases—namely, the somewhat low vital resistance or immunity characteristic of the first two or three years of child life.

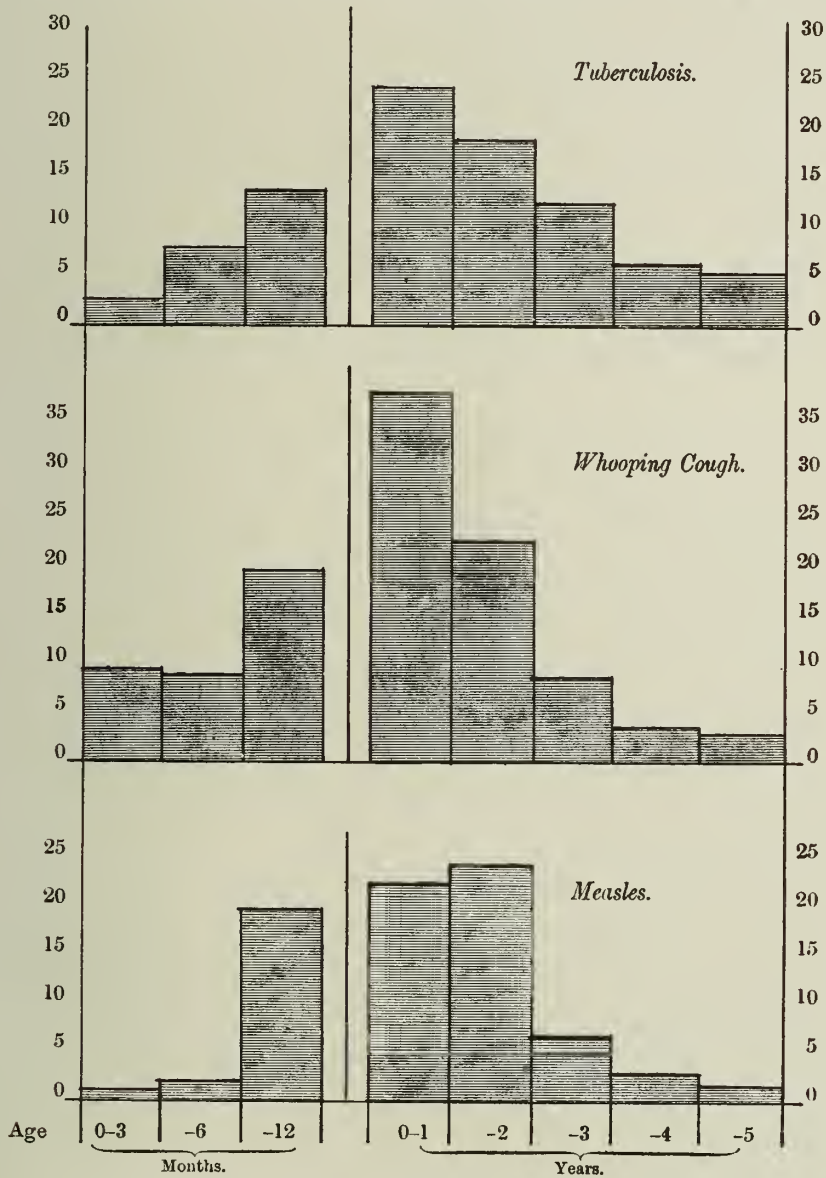
I am far, however, from desiring to be understood as denying that infantile tuberculosis is not in part due to bovine infection. The investigations of the English and German Commissions, as already remarked, make it practically certain that infected cow's milk is a source of tuberculosis in infants and children. But the chief source is human infection.

If during the past ten years, out of an average of 69 deaths annually from tuberculosis among children under five years of age, only one-fifth were due to bovine

DIAGRAM E.

ABERDEEN.—TUBERCULOSIS, WHOOPING COUGH, AND MEASLES.

AVERAGE ANNUAL NUMBER OF DEATHS DURING FIRST FIVE YEARS OF LIFE (1900-1909).



AVERAGE ANNUAL NUMBER OF DEATHS (1900-1909).

Tuberculosis	2.6	7.8	13.8		24.2	18.8	12.6	6.9	5.9
Whoop.Cough	9.5	9.1	19.6		38.2	22.5	8.7	3.9	3.0
Measles . .	0.5	2.0	19.5		22.0	23.9	6.1	2.7	1.7

infection—a proportion justified by the evidence laid before the English Commission—and if it is also kept in view that, for every fatal tuberculous case in childhood, there may be five or ten children who have been permanently injured or maimed by tubercle, then the Town Council would be more than vindicated in adopting every reasonable measure for ensuring the freedom of the milk supply of the city from tuberculous infection.

The dairies inside the city are now subject to periodical veterinary inspection. It would be of much advantage if a similar inspection, carried out by an officer of the Corporation, could be instituted for outside dairies. There is no power to make it obligatory; but, as I have previously suggested, an inducement to submit to it could be offered to dairymen in the shape of a public list or register, in which the names of all dairymen who allow their cows to be inspected for the Corporation would be entered.

Such inspection would be otherwise beneficial. No single article is at once so important as a food and so sensitive to contamination as milk, and none is more directly associated with the health of the community.

In connection with the purity of cow's milk, it is proper to emphasise the purity of human milk. Much work has been done in many places in testing the milk of cows for the tubercular germ; but it is a strange fact that one will almost search in vain the whole literature on tuberculosis for any tests of mother's milk. I endeavoured to have this interesting subject investigated here, but the young medical man to whom I entrusted it was unable, on account of his leaving for a post elsewhere, to carry through the investigation. There can be little doubt, however, that just as with tuberculous cases, so with tuberculous mothers, the milk may be infected. No tuberculous mother should be permitted to suckle her child unless the medical attendant is satisfied, from inspection of the breasts, but preferably from bacteriological examination of the milk, that the milk is likely not to be infected.

(b) *Human Sources of Infection.*—Human sources, as already remarked, are the chief sources of tuberculous infection. Not all cases of tuberculosis are regarded as infectious, and not even all cases of pulmonary tuberculosis, although it is mainly cases of pulmonary tuberculosis in a more or less advanced stage, with a profuse expectoration of sputum, laden, possibly, with many millions of tubercle bacilli, that are dangerous. But no case of tuberculosis should be regarded as absolutely devoid of infective power, for it frequently happens that cases in which the tuberculous disease is supposed to be confined to closed cavities, such as the skull and abdomen, also exhibit the disease, although usually in subordinate degree, in the lungs.

There is no reason to believe that infants, except in very rare instances, are born already infected, when born of tuberculous parents.

For practical purposes every person suffering from tuberculosis may, therefore, be regarded as having become infected at some time and from some source external to himself. It is, however, exceedingly difficult in almost any case to make certain of either time or source; and much that is stated in regard to this, in individual cases, is quite unreliable.

If, as some contend, tuberculous infection may in many cases remain latent for years before producing definite symptoms, the difficulty is greatly increased. To

such cases may belong a considerable proportion of the cases in which the commencement of the disease is attributed to a chill. The chill may have provoked the latent tubercle to fatal activity. In fully one-third of all the cases of phthisis investigated in Aberdeen the illness was said to have started after a chill or exposure to cold.

It may well have happened, however, that in several of these cases the infection found more ready entrance to the body, or a more favourable soil for its development, during the condition of lowered vital resistance induced by a cold.

In rather less than two-thirds of the cases of phthisis the source of the infection was assigned, or could be assigned, to other known cases of phthisis with which the patient had opportunity of contact. The great majority—or, to be exact, about seven-eighths—of these previous cases were in the family or household of the patient. The remaining eighth were cases among intimate friends, near relations, fellow-workmen, and previous tenants of the house.

For abdominal tuberculosis the proportion of cases having a probable family origin was, as already stated, quite as high as for phthisis; while the proportion for tuberculous meningitis was a little less.

In about one-third of all the cases of tuberculosis investigated no definite source of infection could be pointed to. This is not surprising, as tuberculous infection is so widespread that it may be caught anywhere and at any time.

Indeed so widespread and abundant is it, that the dust of streets has been frequently found to contain tubercular germs; so also the sweepings from the floors of public halls, tramcars, and railway carriages, especially if precautions against spitting are not strictly enforced.

Occupation in some cases favours the occurrence of tuberculous infection, chiefly by producing a condition of lowered general health, or by acting injuriously on the air-passages and the lungs, as from the inhalation of gritty dust. This will be more fully referred to later.

The chief vehicle of human infection is the sputum of consumptives or the secretion from the air-tubes of the lungs. In coughing, this secretion is usually in part projected in minute droplets into the air, and may be inhaled by others within a range of three to four feet. The ordinary secretion of the mouth or nose may become contaminated by the lung secretion; and, accordingly, lip contact with consumptives, as in kissing, may convey infection; and so also may sneezed particles of secretion, if inhaled.

Expectorated lung secretion, if not properly collected and destroyed and disinfected, but ejected on to the floor of a room or a workshop, will soon dry, and, when pulverised by the feet, may rise into the air and convey infection by inhalation.

Some are of opinion that much of the inhaled or swallowed infection gets caught in the follicles of the tonsils, and is there absorbed and carried by the lymphatics to neighbouring glands and even to the lungs. Children with unhealthy and enlarged tonsils are, therefore, believed to be more prone than others to tubercular infection. Indeed, in many cases of enlarged tonsils, tubercle bacilli have been found in the tonsils. In a large proportion of the tuberculous children examined, the tonsils were found to be enlarged.

Precautions by Patients against Infection.—In all the cases of pulmonary tuberculosis investigated, inquiry was made as to the precautions taken against the spread of infection.

When it is kept in mind what has already been stated that, in about half of all the cases dying at ages above fifteen years, the patient had never been informed of the real nature of the illness, it was, on the whole, satisfactory to find that considerable precautions had been taken in a large proportion of cases—apparently in almost every case in which the diagnosis was made plain, and in a few cases where the diagnosis was not mentioned to the patient. Thus, in 1907, in 55 per cent. of all deaths from phthisis, the sputum of the patient had been burned or disinfected. In 1908 the proportion was 58 per cent.

Disinfectants for this purpose have been supplied gratuitously for many years by the Sanitary Department when asked for.

In only 7 to 8 per cent. were precautions used with regard to eating utensils—such as keeping a separate set of utensils for the patient's use, or sterilising them.

Wet-dusting of the rooms seemed to be practically unknown.

In the important matter of sleeping arrangements, 28 per cent. of male phthisical patients and 20 per cent. of female patients—altogether about one-fourth—had a separate sleeping room for his or her exclusive use. In other 17 per cent. of the males and 25 per cent. of the females—altogether about one-fifth—the patient had a separate bed, but not a separate room.

In fully one-half of all the cases the patient shared a bed with another member of the household—and this almost right up to the time of death. This must be an important factor in the spread of tuberculous infection.

In many instances it would have been impossible to secure a separate room for the patient; and even a separate bed would have been difficult to obtain, unless an additional bed had been supplied by some charitable agency. Even if tubercle were not infectious, it is very desirable that every tuberculous, especially phthisical, patient should have a separate bed, and, if at all possible, a separate room. Consumptives require for their proper treatment plenty of space and pure air.

The question is raised whether in any further efforts at the administrative control of tuberculosis, the Corporation, if it has the power, should lend, where it is necessary on account of poverty, a bed and bed-clothing for the use of a consumptive patient—the bed and clothing being so marked that they could not be improperly disposed of.

Even the further question is suggested as to whether the Corporation or some charitable agency might not assist poorer families with a consumptive member in renting a larger house, so as to enable the consumptive to have a separate bedroom.

The principle may at first sight appear to be a doubtful one for a Corporation to follow, and may be open to abuse, unless scrupulously worked, but many thousands a year are at present being expended on the isolation of ordinary zymotic cases in hospitals. Three or four pounds per annum would provide an additional room in which the consumptive patient could sleep alone at home. Such isolation would, in suitable cases, be very much cheaper for the Corporation than removal of the patient to hospital.

In New York, special blocks of working-class houses have been erected for the accommodation of tubercle-infected families, the construction of the houses being specially adapted to open-air treatment.

It is very important in future efforts in dealing with tuberculosis that medical practitioners should be less hesitant in suggesting to tuberculous patients the true

nature of their illness, or in, at least, impressing on them the probably infectious character of their lung cold, with a view to proper precautions being carried out, and to free ventilation of rooms being enjoined. If sanatorium treatment is to be sought—and its main utility is in the earlier stages of the illness—it is impossible to avoid being candid with the patient. Fortunately, the medical attendant is better able, with the increased knowledge of recent times and with improved treatment, to hold out large hopes to his patient of the arrest of the disease, provided the case is dealt with at an early stage.

Nothing will more largely assist in advancing the movement for the control of tuberculosis as insisting on the importance of early recognition and early treatment of cases of tuberculosis. The only thing that can be of greater importance is the inculcation of the need for such hygienic habits of living as will prevent or lessen the occurrence of the disease.

In connection with the exercise of precautions by consumptives, I may recall the fact that I prepared, some years ago, a short set of instructions for the use of consumptive patients, but I regret that, although these precautions were apparently not unsuitable for their purpose, since they were afterwards quoted in full by the Local Government Board in their circular on the administrative control of phthisis, and have been placed freely at the disposal of the medical practitioners of the city, they have not been made much use of except by a very few practitioners. One must conclude that many practitioners are diffident in placing in the hands of a consumptive patient a print that would imply a definite diagnosis of the illness.

Infectivity of Tuberculosis (see also p. 106).—No one now doubts that tuberculosis is infectious, and can arise only by infection, except in the rare cases of congenital tuberculosis. But the degree of its infectivity, in dangerous form, for persons in good health and relatively free from inherited predisposition, is low. Evidence of this is found in the frequency with which one of a married pair escapes apparent infection while the other is suffering from phthisis, and in the absence of excessive mortality from phthisis in the nursing staff of consumptive hospitals in this country.

In such hospital staffs it is asserted that the mortality from phthisis is not greater than among persons of the same age in ordinary occupations, and that this has been so for many years, and long before special precautions were used against infection.

As part of my inquiry into tuberculosis in Aberdeen, I have collected particulars of the possible intercommunicability of infection between husband and wife in a considerable number of cases of married persons dying of phthisis. Information was obtained for 121 deaths of husbands and 88 deaths of wives. In 7 of the 121 husbands their death had been preceded by the death or illness of their wives from phthisis. In 4 of these 7 husbands there was a distinct family history of phthisis; in 2 no family history was obtainable owing to the absence of any informant; and in one the family history was free from tuberculosis.

As to the health of the surviving wives, which was inquired into at a period varying from two to six months after the husband's death, it was stated to be "good" in all cases except 9. In only one of the 9 was the health stated to be "bad." This was the case of a woman who died of phthisis two months after her husband. In two other cases there were suspicions of tuberculous disease, but one of these had

previously lost a brother and a sister from phthisis. The other, whose family history was good, I found, on recent inquiry, to be entirely recovered.

Of the 88 wives that died of phthisis, in only two cases was the death preceded by the death of a phthisical husband, and in both the husband had a family history of phthisis. In one, the husband's mother and sister had died of phthisis; and in the other, his sister had died of phthisis and his brother of hip-joint (tuberculous) disease.

Of the surviving husbands all stated their health to be good, except six. One of the six had suffered for many years from asthmatic bronchitis—possibly tubercular—but his sister had died of similar asthmatic bronchitis. A second was suffering from chronic disease of the kidneys, from which he died eighteen months later in the Royal Infirmary, without any tuberculous lesion being found. A third was suffering from chronic bronchitis, which began two years before his wife's fatal illness; his father had died of phthisis. One other had a cough suggestive of phthisis, but the physical signs were slight. The other did not appear to be tuberculous.

In many cases the surviving spouse continued in good health, although not only had the deceased spouse died of tuberculosis, but also many of their children. In one extraordinary case where there had been 17 children born of the marriage, the wife remained in excellent health, notwithstanding that her husband and five of their children had died of phthisis, and one of tuberculous meningitis, and that one was suffering from incipient phthisis. The husband's father and several uncles and aunts had died of phthisis, but the wife's family history was free from tubercle.

There are some who go so far as to maintain that, when regard is had to the frequency of phthisis as a cause of death in the population at large, and to the ordinary probabilities of its occurrence among, say, 100 wives or husbands, apart from infection by their spouses, the number actually dying from phthisis, after the death of their partner from this disease, scarcely exceeds such probabilities.

I have worked out these probabilities, as based on the ascertained average age at death of the 121 husbands (44 years) and the 88 wives (42 years) whose deaths were investigated, and, on an ascertained average duration of married life of 15 years. I find that the number of phthisical wives who predeceased the 121 husbands is about two to three times the number derived from a calculation of the probabilities, and that the number of phthisical husbands who predeceased the 88 wives is about equal to the probabilities, or only very slightly above them.

It is not so easy to test by the same standards the numbers of surviving spouses presumed to be infected by the deceased 121 husbands and 88 wives, as a tuberculous illness cannot be reckoned as a death, and there are no reliable data for illnesses on which one can proceed.

An effort was made about two years later to trace all the surviving husbands of those phthisical wives who died in 1908, with the result that, with one exception—the man who died of kidney disease—all traced were found to be in practically the same state of health as when the inquiry was first made. The surviving wives are more difficult to trace after two years, as a very large proportion have changed their residence; but so far as they were traced the inquiries yielded similar results. One had died, but from a cause other than phthisis.

I have made minute inquiries into the family health history of a large number of tuberculous patients, and have been struck with the fact that, in almost

every instance where more than one member of the family has developed tuberculosis, there was a tuberculous family history. It is not always easy to elicit such histories, partly from the tendency to conceal them, and partly from want of knowledge of the exact cause of death by the relatives; but a little patience will often succeed in disclosing a pronounced history of tuberculosis, although the replies at first were in the negative.

Where predisposition exists, the disease tends to spread in a family, often with appalling freedom, while in other families more happily dowered constitutionally, a single case may continue for years without dangerously infecting other members of the family.

In the course of my inquiries I met with a family which offered, within itself, a remarkable illustration of the apparent effects of both the presence and the absence of predisposition.

A married couple had seven children, whose ages at the time of my visit ranged from 15 to 32 years. All had survived and had enjoyed good health. The parents had each been married previously, and each to a person who died from phthisis after a few years of married life, and who in one case was descended from a distinctly tuberculous family, and in the other from a family with a history suspicious of tubercle. By each of these two earlier marriages there was a family of three children. In each of these two families, two of the children died of tuberculous disease—one soon after the tuberculous parent's death, and the other after 20 to 30 years. The children of all three families, so far as surviving, were brought up together, and the two elder tuberculous members of the two earlier families slept, almost up to the time of their death, in the same room, and even in the same bed, with members of the third family. Yet, the whole of the third family, as well as the two surviving parents—who each came of a stock free from tuberculous history—have had good health, and have never exhibited recognisable symptoms of tubercle. They could scarcely have escaped slight infections, but they have never been dangerously infected, or consciously suffered from tuberculous disease, and none of them shows any symptom of tuberculosis.

There can scarcely be any doubt that the infectivity of tuberculous disease, so far as dangerous infection is concerned, is fortunately low for the large majority of healthy persons. On the other hand, it is high for a susceptible minority, as is, unhappily, illustrated in the freedom with which tuberculous disease passes from member to member of tuberculously predisposed families.

It is, perhaps, not unnecessary to lay some emphasis on the low infectivity of tuberculosis in the production of dangerous illness among healthy persons free from marked predisposition to tuberculosis; for there is the fear that, in the present wide and commendable endeavour to bring home to everyone the fact of the infectious character of tuberculosis, an unreasoning dread of the disease may be created that may inflict hardships on the considerable number of persons who are suffering from slight tuberculous illness, and who with proper precautions are able to continue at their occupation without danger to their fellows.

At the same time no one, however excellent his family history, has a right to regard himself as immune from tuberculosis, and free to ignore every possibility of infection. In a person ordinarily resistant of dangerous attacks of tuberculosis, the resisting powers may become enfeebled by illness, overwork, or worry, or by the character of his occupation. Although the experience of married persons would

appear to show that the risk of infection to healthy persons descended from a healthy stock is small, even in the most intimate of relations, yet it is unwise to run such risk as is implied in occupying the same bed with a consumptive. Even the occupation of a separate bed in the same room should, if possible, be avoided.

Unfortunately, this risk is greatest just where it is most likely to be incurred—namely, in the sleeping together of members of the same family. If one member of the family is tuberculous, whether a parent or a son or daughter, there is a presumption of tuberculous predisposition, and a serious risk of the disease spreading, unless strict precautions against infection are taken.

Parents of families with a known tuberculous predisposition should ever strive in the rearing of their children to heighten their resistance to tuberculosis by hygienic habits of living, and should constantly be on guard against the introduction of dangerous tuberculous infection. They should be careful about the milk supply of their children in infancy, so as to avoid bovine infection; should, if well-to-do and able to employ servants and nurses, make certain that none of these, especially a nurse, is tuberculous; should bring up their children to regard open windows as one of the chief safeguards of their health; should see that they attend well-ventilated and not overcrowded schools; should encourage outdoor life as far as possible; should be careful never to allow colds and catarrhs to go unchecked; should see that convalescence is thoroughly established after such illnesses as measles or whooping cough; and should, under medical guidance, select for their children an occupation that is not associated with a high mortality from tuberculosis. Occupations with much indoor confinement, or, worse still, occupations accompanied by gritty dust, such as stone-cutting in Aberdeen, should be absolutely avoided.

Tuberculosis is unlikely to manifest itself in dangerous form in a family brought up on these lines; but should it invade the household, then safety for the rest lies in the earliest possible recognition of the case, and its consequent hopeful treatment, and in the exercise of every reasonable precaution, under the guidance of the medical attendant.

Poverty and under-feeding, by lowering the general health and the natural resistance to tuberculous infection, favour the occurrence of tuberculosis, especially in susceptible families.

Every measure that makes for the improvement of the health of the community as a whole, and for the diminution of poverty, lowers tuberculous predisposition all round. It still further protects the already virtually immune, and raises above the safety line an increasing proportion of those who formerly suffered from undue predisposition. It is difficult to explain on any other hypothesis the enormous reduction in the tuberculous death-rate during the past fifty years.

Institutional Treatment of Cases of Tuberculosis.—Aberdeen is well provided with medical charities, and it is the fault of the sick person himself or of those in charge of him if he goes without medical aid.

Scarcely any case of serious tuberculous disease has been met with in the city in which medical advice had not been sought and obtained. It has not been uncommon, however, to meet with incipient cases of phthisis, even in houses with a recent fatal case of phthisis, in which no attempt had been made to obtain medical help. So long as the patient is able to go on with his work, he will often do nothing beyond asking a chemist for a cough mixture, or, perhaps, buying some

widely advertised cure. Even when phthisis is suspected, the patient is sometimes unwilling to risk having his suspicions confirmed by the examination of the doctor. The parents of an incipiently consumptive child, especially if following on other cases of consumption in the household, not seldom dread being informed that yet another member of their family has fallen within the clutches of the disease. Hence the value of some arrangement under which the Health Department could seek out cases in their homes, without waiting for an application for medical aid. This can only be satisfactorily accomplished by medical visitation. It would be enough to confine the visits to the houses of the poorer classes, in which well-developed consumptive or other tubercular cases had occurred or died, in order to lead to the discovery of many incipient cases.

As to the treatment of definitely developed cases of phthisis and other forms of tuberculosis, it was found that nearly all were receiving medical attendance, and that a considerable proportion of the cases among the poorer classes had received, for a time, hospital or sanatorium treatment.

The accompanying table (Table IX.) gives for each of the past five years the number of cases of phthisis and of other forms of tuberculous disease receiving treatment as in-patients or out-patients in connection with the charitable institutions of the city, including the Convalescent Home and Sanatorium at Newhills and the Old-mill Poorhouse.

The re-admissions of any single patient within one year to any one of the institutions have, so far as known, been excluded, but allowance must be made for some cases having passed from one institution to another within the same year. These cases have not been discriminated.

With this qualification, it will be observed that a total of 175 cases of phthisis from the city were received last year as in-patients into the various institutions—the Royal Infirmary (58 cases), the Children's Hospital (12), the Morningfield Hospital (2), the Newhills Convalescent Home and Sanatorium (68), and the Poorhouse (35)—and that a total of 194 cases of other forms of tuberculosis (glands, bones, joints, brain, abdomen, etc.) were also admitted. The average duration of the stay was about two months.

The number of phthisis cases receiving institutional treatment has risen considerably, more especially since the opening of the sanatorium at Newhills in 1901, and the transference, in 1907, of the poorhouses to Oldmill, in which there are now two special wards (one for each sex) for the treatment of tuberculous cases.

Besides the cases dealt with as in-patients, a still larger number were treated as out-patients, although it has to be kept in view that certain of the out-patients appear again in the table as in-patients. Without deducting these—their number not being readily ascertainable—altogether 324 cases of phthisis from the city were treated as out-patients—190 at the Royal Infirmary, 4 at the Children's Hospital, and 130 at the Aberdeen Dispensary. In addition, 241 cases of other forms of tuberculosis were also dealt with.

Altogether, as in-patients and out-patients, and without allowing for certain duplications, there were 499 cases of phthisis and 435 cases of other tuberculous diseases that received varying degrees of institutional care during 1909.

During the same year there were 181 deaths from phthisis and 89 deaths from other tuberculous diseases; but for each death from phthisis it is usually reckoned

TABLE IX.—ABERDEEN.—CASES OF TUBERCULOSIS RECEIVING INSTITUTIONAL TREATMENT
(EXCLUDING CASES NOT BELONGING TO THE CITY).

A.—IN-PATIENTS.

YEAR.	ROYAL INFIRMARY.						ROYAL HOSPITAL FOR SICK CHILDREN.						MORNINGFIELD HOSPITAL.				NEWHILLS CONVALES- CENT HOME (SANATORIUM).				PAROCHIAL POORHOUSES.						TOTALS.									
	Phthisis.			Other Tuber.			Phthisis.			Other Tuber.			Phthisis.			Other Tuber.			Phthisis.			Other Tuber.			Phthisis.			Other Tuber.			Phthisis.			Other Tuber.		
	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes	M.	F.	Both Sexes			
1909	39	19	58	55	32	87	8	4	12	57	43	100	1	1	2	0	33	35	68	4	23	12	35	3	104	71	175	194	369							
1908	21	21	42	58	42	100	1	2	3	50	64	114	1	0	1	1	35	33	68	5	20	8	28	9	78	64	142	229	371							
1907	27	18	45	50	33	83	2	3	5	87	79	166	1	4	5	3	35	25	60	3	21	4	25	5	86	54	140	260	400							
1906	33	25	58	53	58	111	2	4	6	77	55	132	2	1	3	0	33	29	62	2	12	6	18	8	82	65	147	253	400							
1905	20	24	44	62	52	114	6	7	13	57	39	96	1	0	1	1	34	29	63	6	7	3	10	7	68	63	131	224	355							

B.—OUT-PATIENTS.

	ROYAL INFIRMARY.			ROYAL HOSPITAL FOR SICK CHILDREN.							ABERDEEN DISPENSARY.			TOTALS.								
	98	92	190	60	55	115	2	2			4	33	34	67	52	78	130	59	152	172	324	241	565
1909																						
1908	58	48	106	70	65	135	6	8	14	45	43	88	61	77	138	82	125	133	258	305	563	
1907	46	28	74	75	62	137	4	5	9	69	39	108	74	79	153	84	124	112	236	329	565	
1906	35	27	62	68	61	129	3	5	8	52	48	100	53	74	127	117	91	106	197	346	543	
1905	16	16	32	55	60	115	2	3	5	51	37	88	66	72	138	111	84	91	175	314	489	

that there are 5 living cases, of which—if one may judge from the average duration of the disease in fatal cases in Aberdeen—there are at least 2 cases that are likely to be fatal. A considerable proportion of the cases receive, of course, private medical attendance at home, and never appear at any charitable institution. If these are deducted, it is obvious that a very considerable proportion of all the tuberculous cases in the city are now receiving charitable medical aid and treatment, although much of it is, doubtless, too late to be effective, and—so far as hospital or sanatorium treatment is concerned—is not continued long enough to give permanent results in more than a small fraction of the cases.

In any reference to the existing provision for hospital and open-air treatment in Aberdeen, it is necessary that notice should be taken of the beneficent work of two separate organisations—the Fresh-Air Fortnight Scheme and the Scotston Moor Camp—for sending some hundreds of poor and ailing children to the country for two or three weeks in summer. Each organisation is provided with a home or building for the residence of the children, but the children spend the whole day in the open air. It would be difficult to over-estimate the value of such schemes in restoring or improving the health of many of the children, and increasing their power to resist dangerous infection by tubercle in the trying weather of the succeeding winter, or in preventing the lighting-up of latent tubercle. Many of the children dealt with are in a pre-tuberculous condition, or are actually the subjects of incipient tuberculous disease. The Town Council has for several years voted a small sum towards the support of this work among the children. It might most usefully be increased. It would be of great advantage if one of the homes could be utilised in winter as a sanatorium for children.

The existing means for dealing with tuberculous cases generally will receive considerable extension by the resolution of the Town Council to admit cases of phthisis to one of the pavilions of the City Hospital for Infectious Diseases.

The pavilion has been specially constructed with a view to its probable use for this purpose, and contains about 40 beds. It is, therefore, capable of giving two months' treatment to 240 patients in a year, or four months' treatment to 120 patients, and will add substantially to the resources of the city in dealing with tuberculosis. It is to be hoped that its full effect may not be lessened through a diminished demand for admission to other institutions. The pavilion will be run mainly on educational lines.

It is of interest to note that, of the cases of phthisis dying in Aberdeen in 1907, 33 per cent., or one-third, had received sanatorium or open-air treatment for a period at Newhills or elsewhere. In 1908 and 1909 the proportion was about 30 per cent. In very few cases had the duration of the period of treatment extended beyond two to three months; but in some cases the patient had received more than one period of treatment.

An inquiry into 170 cases of phthisis in 1905-6 gave almost the same proportion receiving sanatorium treatment. It was also ascertained that nearly half as many more as had received sanatorium treatment would readily have availed themselves of it, had it been possible to get it at the time it was suggested by their medical attendant. In a few cases when the opportunity of a vacancy in a sanatorium (usually the Newhills Convalescent Home) came, the illness had made such progress that the patient was unwilling to leave home.

From the records, which I have been permitted to examine, of the sanatorium attached to the Newhills Convalescent Home, I find that the average stay of the patients in 1908 and 1909 was 63 days. With few exceptions the patients had improved in general health and gained weight. The period of stay is, however, in the light of the experience of sanatoria generally, much too short to be more than a palliative. Authorities on sanatorium treatment are now beginning to admit that at least six months' treatment is desirable, and that often it requires to be extended to nine or twelve months, or even longer.

Such lengthened treatment is an impossibility for nearly every working man, unless not only is the treatment provided gratuitously, but some provision is made for the maintenance of his family during his stay in the sanatorium. Even the mother of a family, although not its bread-winner, has the greatest difficulty—often more difficulty than her husband—in leaving her young family for a lengthened period. Young men and women, although without dependants, are usually opposed to long absence from their occupation, fearing the loss of employment when they return.

There is, therefore, the more justification for regarding sanatoria, and hospital wards run on similar lines, as being largely educational institutions in which the patients will, while receiving some distinct benefit to their health during their stay, learn how to continue to live at home on sanatorium principles.

The ultimate aim of administrative work, in regard to the prevention and treatment of tuberculosis, should be—"Every home and every workshop a sanatorium."

I have made an inquiry into a series of 170 cases of phthisis among the working classes, to ascertain to what extent the patients or their relatives were able and willing to contribute to the cost of sanatorium treatment. I found only seven who professed their willingness and ability to pay the whole charges, on the assumption that it would not extend beyond two or three months, and that it would not cost more than twenty or thirty shillings a week. In twenty other cases a readiness was expressed to pay a proportion of the cost. In some of these cases, however, it was obvious from the circumstances of the household that the proportion would have been very small.

In any scheme of sanatorium treatment for the working classes, especially if the treatment is to continue for at least six months, it is certain that very little pecuniary help can be looked for from the afflicted patients or their relatives. They are often already much impoverished by the expenses of a long illness and, if wage-earners, by loss of work and wages. There is reason to believe, however, that the working classes, as a whole, would gladly do what they can to aid in supporting a sanatorium, or any institution designed for the cure of tuberculous disease; and in this they would be greatly helped by any system of sickness and invalidity insurance which the State may see its way to introduce.

Institutional Deaths from Tuberculosis.—In connection with the institutional treatment of cases of tuberculosis, I have prepared a table (Table X.) showing the places of death of all cases of phthisis and other forms of tuberculosis in Aberdeen during the two years 1908 and 1909.

The table shows that 15 per cent.—or about one-seventh—of all deaths from phthisis, and 21 per cent.—or about one-fifth—of all deaths from other forms of tuberculosis, took place in institutions.

These figures cannot be used to check the proportion of cases receiving institutional treatment as in-patients, as it is not uncommon for a patient who is dying from

TABLE X.—ABERDEEN.—DEATHS FROM TUBERCULOSIS IN INSTITUTIONS DURING TWO YEARS, 1908 AND 1909
(EXCLUDING DEATHS OF PERSONS NOT BELONGING TO CITY).

CLASSIFIED ACCORDING TO SEX, AGE, AND PLACE OF DEATH.

(Corrected for transferred deaths.)

	Age at Death.	DEATHS IN PRIVATE HOUSES (Two Years).			DEATHS IN INSTITUTIONS (TWO YEARS).								All Deaths from Tuberculosis (Two Years).			Percentage of Deaths in Institutions to all Deaths from Tuberculosis.									
		M.	F.	Both Sexes.	Poorthouses.		Hospitals and Nursing Homes.		Lunatic Asylums.		Orphanages and Industrial Homes.		TOTAL IN INSTITUTIONS.		M.	F.	Both Sexes.	M.	F.	Both Sexes.					
					M.	F.	M.	F.	M.	F.	M.	F.	M.	F.							M.	F.			
Pulmonary Tuberculosis	Years.																								
	0-15	15	18	33	0	1	1	1	2	3	0	0	0	1	1	2	2	4	6	17	22	39	12	18	15
	15-25	27	36	63	3	1	4	4	4	8	1	0	1	0	0	0	8	5	13	35	41	76	23	12	17
	25-60	94	97	191	8	4	12	8	3	11	5	4	9	0	0	0	21	11	32	115	108	223	18	10	14
	60+	12	8	20	4	0	4	0	0	0	0	1	1	0	0	0	4	1	5	16	9	25	25	11	20
All Ages	1908+1909	148	159	307	15	6	21	13	9	22	6	5	11	1	1	2	35	21	56	183	180	363	19	12	15
	Average Yearly No.	...	...	154	...	...	10	...	...	11	...	...	6	...	...	1	...	...	28	...	...	182	...	...	15
	0-15	71	50	121	0	0	0	8	13	21	0	0	0	2	0	2	10	13	23	81	63	144	12	21	16
Other Tuberculous Diseases	15-25	7	4	11	1	2	3	4	2	6	0	0	0	0	0	0	5	4	9	12	8	20	42	50	45
	25-60	11	6	17	0	2	2	3	1	4	0	1	1	0	0	0	3	4	7	14	10	24	21	40	29
	60+	1	0	1	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2	2	1	3	50	100	67
	1908+1909	90	60	150	1	4	5	15	16	31	1	2	3	2	0	2	19	22	41	109	82	191	17	27	21
All Ages	Average Yearly No.	...	...	75	...	...	3	...	...	15	...	...	1	...	...	1	...	...	20	...	...	95	...	...	21
	1908+1909	238	219	457	16	10	26	28	25	53	7	7	14	3	1	4	54	43	97	292	262	554	19	16	18
ALL TUBERCULOUS DISEASES.	Average Yearly No.	...	...	229	...	...	13	...	...	26	...	...	7	...	...	2	...	...	48	...	...	277	...	...	18

phthisis in an institution to be allowed, at his own urgent request, to return home. Moreover, many cases receiving institutional treatment have so benefited by it that they leave the institution in order to resume their work, although if they relapse they may not again seek institutional treatment.

It will be observed, in regard both to cases receiving indoor treatment and to deaths in institutions, that the men are considerably in excess of the women. This is especially noticeable in the Poorhouse, into which, during the past five years, 83 men were admitted for phthisis, and only 33 women; in the Royal Infirmary the corresponding numbers were 140 and 107; and in Newhills Sanatorium, where the difference was much less, 170 and 151. An even greater difference is noticeable in regard to deaths.

Apart from the somewhat larger number of women suffering from phthisis as compared with men, the probable explanation is that when a man is thrown out of work by illness, he is of little or no use at home, and is anxious to get well as speedily as possible in order to resume work, and, therefore, enters an hospital, whereas a woman, although ill, may still be of some use at home in looking after her children, and there is usually no call to undertake wage-earning work.

Curability of Tuberculosis.—There can be no doubt that the popular belief as to the practical incurability of consumption, although, like all popular beliefs, not without some foundation, is erroneous. It errs chiefly in being based on the observation of advanced cases. Unfortunately, while a considerable proportion of such cases may, under suitable treatment, have their lives prolonged, they are seldom restored to their former health, and the disease is practically never cured.

But for every advanced case there are, almost certainly, several mild or incipient cases of which the public usually know nothing. Some of these cases go on to advanced stages, and later become ordinary cases of consumption, recognisable by all.

Others never pass beyond the earlier stages, and may, without a complete or even an approximate return to good health, continue to suffer from indifferent health for a long lifetime, and are often merely regarded as suffering from bronchitis or asthma. I have met, as I believe, with many such cases in my inquiries. Unfortunately, although such persons may continue all through life to be more or less fit for their ordinary duties, they are, if parents, and especially if mothers, not infrequently a continuous source of tuberculous infection to their children.

There are still others—and their number is probably very much larger than was at one time believed—who, after a slight invasion of their lungs by tubercle, make a virtually complete recovery, and become restored to ordinary health in a few months or in a year or two. The symptoms in many of these cases are so mild that the presence of tubercle in the lungs may never have been suspected. It is only after death from other causes, in later life, that the pathologist discovers its presence, mostly in the form of old cicatrices or calcareous nodules.

Many of such cases had recovered without any special treatment. For modern knowledge justifies the belief that, although nearly all may be subject to tuberculous infection at one time or other, the great majority are capable of overcoming the infection in virtue of their natural vital resistance or immunity. It is only the relatively few that are overcome by the infection.

With phthisis or tuberculosis, as with nearly all diseases, the tendency is towards

recovery. Nature is ever repellant of attacks upon healthy life, and assists the animal organism in forging weapons for its defence against the ravages of tuberculous, as well as other, germs. In the great majority of cases we have reason to believe it is successful. In others we know it fails, even when it has received all the help that medical science can offer.

But there remains a certain proportion of cases—how large we scarcely as yet know—in which the opposing forces are nearly equal, and in which it is possible to turn the tide of battle in favour of Nature by properly devised human aid.

The agencies at man's disposal for the aid of Nature have in recent years begun to be better understood than formerly, with the result that we believe that it is now possible to save lives that would formerly have been lost.

These agencies are mainly hygienic. I have already expressed the opinion that the striking fall in the mortality from tuberculosis during the past forty to fifty years is probably due chiefly to improvements in the health of the community as a whole, caused by various developments, economic and social, as well as those of a designedly sanitary character.

It may almost be reckoned a modern discovery that hygienic treatment, applied to the individual consumptive, is often remarkably beneficial. Hence the growth of the sanatorium movement, which relies almost entirely on purely hygienic measures—fresh air, good feeding, and proper regulation of the habits of living. Such measures recuperate and strengthen the forces that are struggling within the body to overcome the tuberculous germ. If brought into operation early, experience proves that there is considerable likelihood of success. If sought late, when the tubercle-infected tissues have begun to break down, they will usually ameliorate the condition for a time, and delay a fatal issue, but they rarely bring about recovery.

Sanatorium treatment has, therefore, come to occupy an important place in the agencies for combating tuberculosis in its incipient stages.

But it must not be relied upon to restore every incipient case; for it must frankly be recognised that there are always a few cases, whatever be the stage, that go rapidly from bad to worse, in spite of every kind of treatment. Nor must one expect in every case a complete cure. Tuberculosis is always difficult to cure; but such an arrest of the disease is often attained as is virtually equivalent to a cure.

Judging from the number of cases of phthisis known to have received sanatorium treatment at Newhills, and from the number of deceased cases in the city with regard to whom their relatives have stated that the cases had undergone a period of treatment at Newhills, one must reluctantly conclude that a very large proportion of the cases so treated have ultimately succumbed. At the same time, in almost every case, the relatives have readily and gratefully admitted that the patient returned from the sanatorium much benefited.

Two causes have operated to make the treatment in the final issue of the case less beneficial than it might be. The stay, which, as already stated, has hitherto averaged about two months, is for the majority of the cases too short; and, until recently, owing to the kindly desire of the committee to avoid disappointment to anxious applicants, cases have frequently been admitted regarding which, because of the disease having made considerable progress, the prospect of recovery was slight, although temporary amelioration was usually possible.

With the stricter exclusion of cases that have passed beyond the incipient stage

that is now being exercised, and with the longer stay in the sanatorium that is now beginning to be insisted upon, better ultimate results will no doubt be secured. But a prolongation of stay from two to, say, five or six months will, of course, greatly reduce the number of patients that can be dealt with in a year, and thus narrow the benefits of the sanatorium unless an extension of the accommodation in the sanatorium can be undertaken, or an entirely new sanatorium can be erected.

Meantime, some relief will be obtained by the opening of the pavilion for consumptives at the City Hospital. This pavilion should be able to take all the cases that are able to stay for only one or two months in a sanatorium, and all the more advanced cases that have hitherto pressed for admission at Newhills. Newhills will thus be left free for the reception of incipient cases only.

I have so far laid stress on the benefits to be expected from the simple hygienic treatment of phthisis cases. Treatment by drugs has in the past been of comparatively little advantage, if we exclude tuberculin, which is not a drug in the ordinary sense.

Tuberculin has not yet been extensively tried in this city, or, indeed, generally, in the treatment of phthisis; and too high expectations must not be formed regarding it. There are, however, some medical authorities who consider it to be at least of equal value to sanatorium treatment, with the advantage that it can be carried on in many cases while the patient still continues at his work.

It is desirable that it should receive a full trial in the treatment of the cases to be admitted to the City Hospital.

I have perused a large part of the more recent literature on the subject, and the results, on a conservative estimate of their value, appear to me to be capable of being summarised thus:—Among cases undergoing treatment in sanatoria—and it is chiefly among such cases it has been tried—tuberculin appears to increase, but not greatly, the proportion of recoveries in incipient cases. Incipient cases appear to do nearly as well under sanatorium treatment alone, as when tuberculin treatment is combined with it. Cases, however, that have reached the second or middle stage of the disease improve much more rapidly under tuberculin treatment than under sanatorium treatment alone. In some institutions the results have been twice as good with tuberculin as without it.

The important administrative question as to whether incipient cases can improve as rapidly under tuberculin treatment alone as under sanatorium treatment alone has been answered in the affirmative by more than one enthusiastic advocate of tuberculin treatment, but a wider experience is wanted before a final answer can be given. If such answer is favourable, it may at least be possible, with the aid of tuberculin, to curtail greatly the period of stay of incipient cases in sanatoria, if not altogether to dispense with it. For it must usually be advantageous for even an incipient consumptive, whose general health is nearly always somewhat run down, to have one or two months' rest and general recuperation as a preliminary to tuberculin treatment, or, rather, as an accompaniment of the first stages of it. But it would greatly reduce the cost of sanatoria, both in capital outlay and in maintenance, if tuberculin treatment would allow of the stay of patients being considerably shortened.

It would also help to lighten other serious difficulties. It would enable parents to return much sooner to their families, and workers to their work. There would

be a smaller loss in earnings, and a better prospect of a situation being kept available for the return of the patient.

As to the greater permanency of the results of tuberculin treatment as compared with those of sanatorium treatment, there is not yet sufficient evidence to justify a definite opinion. Such evidence as exists points to the superiority of tuberculin treatment, especially if the treatment is renewed from time to time for two or three years after the apparent recovery of the patient.

In regard to all forms of treatment of phthisis that merely serve to prolong life for a year or two without permanent arrest of the disease, it is possible to allege that, from the standpoint of preventive medicine, they may eventually do more harm than good, inasmuch as they lengthen the duration of the period of illness, and, therefore, the duration of the infectiousness. The consumptive may enjoy a little longer life at the risk of adding to the number of persons whom he may infect. The additional risk will, however, be probably compensated for by the education of the patient in personal preventive methods—an education that ought always to accompany every serious effort to treat any case of phthisis.

In every discussion of the curability of phthisis by hygienic treatment, it cannot be too strongly emphasised that, if the treatment is more effective when commenced early, it is still more effective as a preventative, and that every person, whose family history or state of health brings, in favouring circumstances, an attack of tuberculosis within the range of probability, should be taught by the family medical attendant to follow as far as possible the hygienic rules that are laid down for the incipient consumptive.

Parents of families with a tuberculous tendency should also exercise care in the choice of an occupation for their children that will not favour the occurrence of phthisis. They should avoid all occupations in which there is much dust, especially gritty dust as in stone-cutting and steel-grinding, or occupations with close confinement, such as tailoring and clerking, or occupations with much night work.

Tuberculosis in relation to Occupation.—I have endeavoured to ascertain the mortality from phthisis in the city, during the ten years, 1900-9, in relation to some of the occupations.

It is difficult to obtain with accuracy the necessary data. A workman who has contracted phthisis in one occupation may change his occupation some months or years before death, and his relatives on registering his death may or may not give his original occupation as his ordinary occupation. Much depends on the length and nature of the last occupation—whether it is presumed to be inferior or not—and on the person to whom it may fall to supply the information required by the registrar. Even the registrars themselves act differently in such cases of changed occupation.

There is also much difficulty in obtaining precise information regarding the number of persons employed in any trade, especially if the information is wanted for a series of years. In some trades, such as the building trade, which gives employment to a great variety of workmen, there have, as is well known, been great fluctuations in this city within the past ten years.

Another source of error is the possible difference in ages between the workmen in one trade as compared with those in another, owing to different proportions of apprentices, or to the emigration of younger members, or to the tendency of employers

in certain trades requiring much skill and energy to eliminate the older workmen from the workshop. The mortality from phthisis is higher at certain ages than at others, as has already been pointed out. The mortality in any trade may therefore be affected considerably by the so-called age-constitution of the workmen.

The figures in the accompanying tables are derived, so far as concerns deaths, from the death registers of the city, and, so far as concerns number of workmen, mainly from inquiries at the secretaries of the several trade unions. In a few cases they have been estimated from the last census; and in the case of the stonecutters and masons I am largely indebted to the Factory Inspector.

Considerable interest attaches in Aberdeen to the incidence of phthisis among stonecutters and masons, owing to their considerable number and to the danger to which they are exposed from the inhalation of granite dust. All masons are not, however, so exposed, as a proportion of them—varying with the character of the building—are employed solely in building, and are known within the trade as “wallers,” while the remainder are engaged in hewing and dressing stones. Wallers are not so distinguished in the death registers. Nor is any distinction made in the registers between masons—whether hewers or wallers—employed in connection with buildings and stonecutters employed in the numerous monumental yards. As a rule, a hewer working in the latter is known as a stonecutter, but he is not infrequently designated a mason.

In calculating the death-rate among hewers, it has been found necessary to form masons and stonecutters into one group, and to include wallers. As wallers are not exposed to the inhalation of dust, and presumably do not suffer more from phthisis than the average workman in other trades, their inclusion in the group tends to lower the death-rate from phthisis; but after careful inquiry, I am of opinion that their proportion in the whole group during the past ten years has not exceeded one-seventh, owing to the large number of stonecutters in the monumental yards.

Stone-polishers and stone-sawyers form a separate group, as the processes in which they are engaged are wet processes, and not accompanied with dust.

For all the occupations dealt with, I have omitted persons under 21 years of age—that is, roughly, all apprentices—as they vary considerably in their proportion, and in their age at entrance, in different trades. I have also excluded masters, who are usually not exposed to the same occupational risks as their workmen.

I have given, for comparison, the death-rate from all other causes of death, and have separately distinguished lung diseases other than phthisis, as also diseases of the circulatory and nervous systems. The last two are taken together, owing to considerable changes recently in their classification.

Table XI. gives the number of deaths during the ten years, 1900-9, from pulmonary phthisis and other causes among persons employed in several selected trades. The proportion of deaths from (a) phthisis and from (b) phthisis and other lung diseases combined to the total deaths from all causes is also stated.

The percentage of deaths from phthisis to deaths from all causes is highest for printers and lithographers (33 per cent.), stonecutters and masons (31 per cent.), and clerks (26 per cent.). These are considerably above the rest. It is lowest for bakers, carters, joiners, and labourers, with 7 to 9 per cent. The highest are, therefore, about four to five times as high as the lowest.

If all lung diseases are included with phthisis, the difference between the highest

TABLE XI.—ABERDEEN.—OCCUPATIONAL MORTALITY, 1900-09.
NUMBER OF DEATHS OF PERSONS ABOVE 21 YEARS OF AGE (EXCLUDING EMPLOYERS).

OCCUPATION.	Estimated Average Annual No. of Persons above 21 years of age employed (1900-09).	TOTAL NO. OF DEATHS IN TEN YEARS (1900-09).						Proportion of Deaths from Phthisis and All Lung Diseases to Deaths from All Causes. All Causes = 100.		
		Phthisis.	Lung Diseases.		Circula- tory and Nervous Diseases.	Other Diseases.	ALL DIS- EASES.	Phthisis	All Lung Diseases	All Causes.
			Excluding Phthisis.	Including Phthisis.						
MALES.										
Stonecutters and Masons	1,750	99	43	142	80	94	316	31	45	100
Stone Polishers and Sawyers	420	11	21	32	21	23	76	14	38	100
Joiners, Sawyers, Shipwrights, Cabinet- makers	1,420	26	48	74	99	122	295	9	25	100
Painters	420	9	17	26	39	22	87	10	30	100
Tailors	620	20	35	55	56	53	164	12	33	100
Bakers	360	5	16	21	23	30	74	7	29	100
Engineers, Blacksmiths, Riveters, Firemen	2,600	47	60	107	134	126	367	13	29	100
Printers and Lithographers	380	17	4	21	17	14	52	33	41	100
Combmakers	345	15	15	30	25	23	78	19	38	100
Carters	1,450	16	45	61	44	72	177	9	34	100
Labourers	3,600	81	203	284	299	352	935	9	31	100
Clerks	1,220	46	18	64	48	66	178	26	36	100
FEMALES.										
Dressmakers and Milliners	1,750	34	26	60	47	57	164	21	37	100
Domestic Servants	3,500	74	116	190	238	310	738	10	26	100

and lowest is much less marked—the highest being barely twice as high as the lowest. Thus, for stonecutters and masons, the percentage of deaths from these diseases to all deaths is 45; for printers and lithographers, 41; and for combmakers, stone-polishers, dressmakers and milliners, and clerks, 36 to 38. The lowest are joiners, with 25 per cent., and domestic servants, with 26; and the next are bakers and engineers, with 29.

Table XII. gives the death-rates from phthisis and other causes per 1,000 persons employed in the selected occupations; and, for comparison, it also gives the corresponding death-rate among the whole population of the city at ages above 21 years—males and females being separately distinguished.

This table shows that stonecutters and masons stand above all the others with a death-rate (5.7 per 1,000) from phthisis that is three times as high as the average (1.9) for males above 21 years. If allowance is made for the inclusion of wallers, among whom the mortality from phthisis can scarcely be higher than the average, the death-rate among persons actually engaged in the cutting and hewing of granite is probably about 6.2 per 1,000.

Next to stone-workers come printers and lithographers, with 4.5 per 1,000, or slightly less than two and a half times the average. Then follow combmakers, with 4.3; clerks, with 3.8; and tailors, with 3.2 per 1,000.

These are the occupations, of those investigated in Aberdeen, that may be said to suffer unduly from phthisis.

The occupations suffering least are those of carters, with only 1.1 per 1,000, and bakers, with 1.4.

As a rule, occupations with a high mortality from phthisis have also an increased mortality from other lung diseases. This is not the case with stonecutters and masons in Aberdeen, or with printers and lithographers, or with clerks. In all three occupations, the mortality from other lung diseases is under the average. Tailors and combmakers, however, follow the usual rule, having a somewhat high mortality from other lung diseases. The result is that, if the rates for phthisis and other lung diseases are combined, tailors and combmakers, with 8.8 and 8.6 per 1,000, respectively, take precedence of stonecutters and printers, with 8.2 and 5.6, respectively. For clerks it is 5.3.

Indeed, the total death-rate from lung diseases (including phthisis) among clerks and printers is only very slightly beyond the average (5.2) for all male persons above 21 years of age.

Some of these differences in the incidence of phthisis and of other lung diseases are probably in some measure more apparent than real, being dependent on the fact that the death-rate from phthisis decreases after the age of 55 to 60, while the death-rate from other lung diseases rapidly increases with advancing age. Occupations with a large proportion of old men have accordingly a lower death-rate from phthisis and a higher death-rate from other lung diseases than occupations with a smaller proportion of old men.

The proportion of old men engaged in stonecutting is lower than the average, and this is more distinctly the case with printers, and especially with clerks. On the other hand, the proportion of old men among tailors is high, and it is probably fairly high among combmakers.

In order to assist in eliminating the error due to differences in the age-constitu-

tion, I have prepared Table XIII., which divides the deaths from phthisis and other lung diseases into two groups, according as the ages of the deceased are below or above 55 years—an age which in many trades marks the commencement of the time when the services of the workman begin to be considered less valuable, and employment at his trade becomes more precarious.

For the purpose of calculating the death-rate in the group of persons dying under 55 years, I have prepared, from the census of 1901, estimates of the proportion of persons under that age. In one case the estimate was obtained from employers.

For ages under 55, this table still reveals the occupations of stonecutters and masons, printers and lithographers, combmakers, clerks, and tailors as having the highest death-rate from phthisis, and carters, bakers, and engineers as having the lowest.

If the deaths from other lung diseases are included, the death-rates become more equalised. For example—and the illustrations are interesting as being drawn, both of them, from dust occupations—the death-rate becomes 5.8 among stonecutters and masons, and 4.2 among bakers, although the death-rate from phthisis alone among the former is 4.9, and among the latter is 1.2. The low death-rate from phthisis among bakers is counter-balanced by a high death-rate from other lung diseases, chiefly bronchitis; and it is a question whether some of these bronchitic cases may not have been of a tuberculous character, although somewhat different in their symptoms from typical cases of phthisis.

The healthiest of all the male occupations dealt with are those of carters and engineers (including blacksmiths and similar workers in iron). The first is an entirely open-air occupation, and is not accompanied by continuous physical strain, or by exposure to dust, apart from street dust. Street dust has sometimes been found to contain tubercular germs from dried sputum, but it has evidently little effect in producing phthisis in carters. The occupation of engineers and other workers in iron is also largely open-air, although it is not free from dust, and is accompanied by considerable strain.

Clerks and tailors show the effects of a sedentary occupation in their distinctly high death-rate from all lung diseases. In the case of clerks, the excessive rate is entirely due to phthisis.

Dressmakers and milliners, differing from tailors and clerks, have a comparatively low death-rate from lung diseases. It may be that the full effects of the occupation of dressmaking and millinery are not exhibited in the figures, owing to the occupation, especially in the case of the younger women, not always being stated when the death is registered; but this possible error could scarcely account for the large difference between, say, clerks and dressmakers, who are largely drawn from the same classes of the population. The somewhat larger amount of physical exercise in sewing as compared with clerking may have some influence, although it must be admitted that similar exercise does not greatly lessen the mortality among tailors.

The number of persons employed as clerks is now large, and is rapidly increasing, especially if female clerks are included; and the figures presented in these tables show the necessity for increased attention being given to the health conditions of their employment, and particularly to the provision of sufficient cubic space and plenty of fresh-air and sunshine.

The high death-rate among printers and combmakers is probably in part due to

TABLE XIII.—ABERDEEN.—OCCUPATIONAL MORTALITY, 1900-09.

DEATHS GROUPED ACCORDING AS AGE WAS UNDER 55 OR ABOVE 55 YEARS AMONG PERSONS ABOVE
21 YEARS OF AGE (EXCLUDING EMPLOYERS).

OCCUPATION.	Estimated Percentage of Persons above 55 Years from Census 1901.	No. of Deaths in Ten Years, 1900-09.				Deaths under 55 Years per 1,000 Persons under 55 Years.		
		Phthisis.		Other Lung Diseases.		Phthisis.	Other Lung Diseases.	All Lung Diseases.
		Under 55 Years.	Above 55 Years.	Under 55 Years.	Above 55 Years.			
MALES.								
Stonecutters and Masons	9	77	22	14	29	4.9	0.9	5.8
Stone Polishers, etc.	10	9	2	9	12	2.4	2.4	4.8
Joiners, etc.	16	24	2	12	36	2.0	1.0	3.0
Painters	7	9	0	7	10	2.3	1.8	4.1
Tailors	16	17	3	7	28	3.2	1.3	4.5
Bakers	7	4	1	10	6	1.2	3.0	4.2
Engineers, etc.	12	44	3	26	34	1.9	1.1	3.0
Printers, etc.	5	17	0	2	2	4.7	0.6	5.3
Combmakers	15	13	2	2	13	4.5	0.7	5.2
Carters	8	15	1	26	19	1.1	1.9	3.0
Labourers	22	67	14	71	132	2.4	2.5	4.9
Clerks	6	46	0	10	8	4.0	0.9	4.9
FEMALES.								
Dressmakers, etc.	11	33	1	7	19	2.1	0.5	2.6
Domestic Servants	10	66	8	26	90	2.2	0.9	3.1
All Males 21-55 years irrespective of employment						2.1	1.5	3.6
All Females 21-55 years do.						1.9	0.8	2.7

dust, although in neither case is the dust gritty, as with stonecutters. The necessary night employment of many of the printers in the production of newspapers probably favours the occurrence of phthisis. Definite lead-poisoning is uncommon among printers in Aberdeen, but mild forms of it that escape definite recognition may deteriorate their health.

Before leaving Table XIII., attention may be directed to the exceptionally large number of deaths from phthisis among stonecutters after the age of 55. In nearly every other occupation, except that of labourers, phthisis is relatively rare as a cause of death after this age; and it is possible that, so far as concerns Aberdeen, the considerable number of deaths from phthisis among older labourers is in part due to the presence among them of former stonecutters.

Among 1,750 stonecutters and masons there were during the past ten years 22 deaths from phthisis of persons above 55 years of age. Among 3,600 labourers there were 14 deaths. In the 9,635 other male persons dealt with in the tables there were only 14 deaths. Many cases of phthisis in stonecutters must either have begun late or lasted long. Such may be cases of persons with little constitutional predisposition to tuberculosis in whom the tubercle germ only succeeds in overcoming the greater vital resistance after a protracted struggle.

In order to complete the information supplied as to occupational mortality, I add a table (Table XIV.), in which the average age at death is stated for each occupation and each disease or group of diseases, as also for all causes. In reading this table, as also in referring to the death-rate from all causes in Table XII., it must be kept in mind that the age at death and the total death-rate are both much influenced by the proportion of old or young persons in any occupation.

A low death-rate is not necessarily accompanied by a high average age at death, nor a high death-rate by a low average age. For example, one of the lowest death-rates from all causes is among clerks, with a rate of 14.6 per 1,000, yet their average age at death (47 years) is also the lowest for any of the tabulated occupations. On the other hand, the highest death-rate (26.5 per 1,000) is among tailors, yet their average age at death, in place of being low, is 59 years, and is one of the highest. The explanation mainly is that clerks are largely younger men, and that, in Aberdeen at least, tailors are largely older men. In other words, in comparing occupations in regard to mortality, it is essential to keep in view possible differences in the age constitution of the body of persons employed.

Subject to this qualification, it may be noted that the occupations with the highest average age at death from all causes are joiners, tailors, labourers, and combmakers, with ages of 60, 59, 59, and 57 years respectively, and that those with the lowest age are clerks, printers, painters, and stonecutters and masons, with 47, 48, 51, and 51 years respectively.

In regard to the average age at death from phthisis, it is highest for combmakers, stonecutters and masons, stonepolishers, tailors, and labourers, with 47, 43, 43, 41, and 41 respectively; and it is lowest for painters, clerks, and printers, with 30, 30, and 33 respectively.

Two of the occupations (stonecutting and combmaking) with the highest death-rate from phthisis are the two occupations with the highest average age at death from that disease. Both are dust occupations. There is some ground for believing, not only from these figures, but from the results of similar investigations elsewhere,

TABLE XIV.—ABERDEEN.—OCCUPATIONAL MORTALITY, 1900-09.

AVERAGE AGE AT DEATH OF PERSONS DYING AT 21 YEARS OF AGE AND UPWARDS
(EXCLUDING EMPLOYERS).

OCCUPATION.	Phthisis.	LUNG DISEASES.		Circulatory and Nervous Diseases.	Other Causes.	ALL CAUSES.
		Excluding Phthisis.	Including Phthisis.			
MALES.						
Stonecutters and Masons .	43	56	47	55	54	51
Stone Polishers	43	56	51	63	50	54
Joiners, etc.	36	63	53	63	62	60
Painters	30	58	49	54	50	51
Tailors	41	64	55	65	57	59
Bakers	39	54	50	60	58	56
Engineers, etc.	38	54	47	61	56	55
Printers and Lithographers .	33	49	36	59	52	48
Combmakers	47	61	54	58	56	57
Carters	38	53	49	57	55	54
Labourers	41	59	54	70	54	59
Clerks	30	47	35	53	53	47
FEMALES.						
Dressmakers and Milliners .	29	62	43	58	55	52
Domestic Servants . . .	34	66	54	65	64	62

that dust-produced phthisis is, in many cases, slow in leading to a fatal result. On the other hand, clerks, with a high death-rate from phthisis, have a low average age at death from that disease. This, no doubt, is in large part due to age constitution, but it suggests the question whether phthisis caused by vitiated air, as in small ill-ventilated offices, and occurring among persons working with the chest in a cramped position, does not tend to a speedier issue. The figures for tailors are rather opposed to this view.

The four occupations with the lowest death-rates from phthisis—namely, carters, bakers, engineers, and joiners—have average ages at death from that disease of 38, 39, 38, and 36, respectively. These ages, as compared with those for other occupations, are neither high nor low.

Stonecutters and pneumatic tools.—In regard to the mortality from phthisis among stonecutters and masons, the question has been raised as to whether the introduction of pneumatically driven tools, which produce more fine dust than the old hand chisels, has increased the amount of phthisis and lung disease. I am informed that previous to 1900 very few pneumatic tools were in use in Aberdeen. Between 1900 and 1905, and especially after 1902, their use rapidly extended, so that by 1905 they had come into full use in practically all stonecutting yards.

The following table gives the number of deaths among stonecutters and masons combined for each of the fifteen years, ending with 1909. The first five years—1895-9—represent a period practically unaffected by pneumatic tools; the second five years—1900-4—a period in which pneumatic tools were coming into use; and the third five years—1905-9—a period in which the tools were in full use. Only deaths at ages of 21 years and upwards are included.

FIRST PERIOD (1895-9).

Number of Deaths from—

	1895.		1896.		1897.		1898.		1899.	Totals.
(a) Phthisis . . .	6	...	9	...	12	...	7	...	13	= 47
(b) Other Lung Diseases	5	...	1	...	5	...	9	...	8	= 28
										75

SECOND PERIOD (1900-4).

	1900.		1901.		1902.		1903.		1904.	Totals.
(a) Phthisis . . .	10	...	6	...	13	...	12	...	9	= 50
(b) Other Lung Diseases	6	...	10	...	5	...	2	...	8	= 31
										81

THIRD PERIOD (1905-9).

	1905.		1906.		1907.		1908.		1909.	Totals.
(a) Phthisis . . .	11	...	10	...	9	...	11	...	8	= 49
(b) Other Lung Diseases	2	...	3	...	3	...	1	...	3	= 12
										61

The numbers for 1900-4 are slightly above those for 1895-9 in respect both of phthisis and of other lung diseases. The total number for 1905-9 is, however, considerably down; but the fall is practically confined to deaths from lung diseases other than phthisis.

The first two periods are fairly comparable, except that allowance should be made for an increase of, perhaps, 10 per cent. in the number of persons employed as between the first and second periods, and for the fact that during these two periods the mortality from phthisis in the community as a whole was falling. As probably the effect of the latter influence did rather more than equalise the effect of the former, a comparison of the first two periods would appear to show that the introduction of pneumatic tools had produced some increase, although not a large increase, in the death-rate from phthisis and other lung diseases.

As regards the third period (1905-9), while the number of stonecutters and masons employed in monumental yards has not fallen off but rather increased, there has been a great decline in the number of building masons in employment, due to unusual depression in the building trade. Some of these out of employment as mason hewers have, I believe, found employment as stonecutters in monumental yards, and thus checked in some measure the advancement of apprentices to the

status of journeyman. Some have emigrated to America. Some have drifted into labouring, but not improbably in the event of death within two or three years of leaving their trade, their deaths have been registered by their relatives as the deaths of masons. It is difficult to know to what extent to make allowance for these disturbing factors. Probably, any reasonable allowance would not raise the total number of deaths from phthisis and other lung diseases combined above or even up to the number for each of the preceding two quinquennial periods, but it would raise the number of deaths from phthisis above the numbers for these periods.

The workmen employed at stonecutting in monumental yards are usually known as stonecutters, although sometimes called masons; while those employed in building yards are usually called masons, although sometimes designated as stonecutters. If we take the deaths of persons during the past fifteen years, who when they died were registered as stonecutters, we find that in the three five-year periods, beginning with the first, the number of deaths was 29, 28, and 36 respectively. This gives an increase of 8 deaths in the third period as compared with the second period, or an increase of nearly one-third. If, however, the deaths from other lung diseases are added, the figures for the three periods become 39, 43, and 42. Allowing for an increase of workmen over the fifteen years, these figures would not appear to indicate any appreciable increase in mortality; but they must be viewed in the light of the fact that since 1895-9 the mortality from phthisis and other lung diseases in the city generally has fallen very considerably. The conclusion must therefore be that the introduction of pneumatic tools has prevented stonecutters sharing in the general decline in the death-rate from lung diseases.

It is of interest to add that the average age at death of stonecutters dying of phthisis and other lung diseases has risen considerably, being for the three five-year periods, 38, 44, and 46 years respectively.

About the time of the introduction of pneumatic tools for granite cutting, but not altogether as a consequence of it, the sheds, which had usually been entirely open along the front, as in the case of an ordinary builder's shed, began to be closed. The closure, while increasing the liability to the inhalation of dust, must at the same time have afforded some protection against cold and possible chills. This may possibly account in part for the diminution during the past five years in the number of deaths from lung diseases other than phthisis. But the numbers dealt with are small, and allowance must be made for mere chance variations.

During all three periods the mortality from lung diseases other than phthisis has been exceptionally low as compared with the rate in other occupations. The unusual combination, in the case of workers in stone, of a high mortality from phthisis, with a low mortality from lung diseases other than phthisis, may serve to bear out the statement made by the late Professor Hamilton, Professor in Pathology in Aberdeen for about 25 years, and previously for several years pathologist to the Edinburgh Royal Infirmary, that a definite development of so-called lithosis, or a fibroid affection of the lungs due to stone dust, is rare among granite workers in Aberdeen, although common among freestone workers in Edinburgh.

I have searched the post-mortem records of the Aberdeen Infirmary for the past fifteen years for information on this point, and have found few marked indications of lithosis in stonecutters, whatever was the cause of death; but the autopsies of stonecutters and masons are not numerous, and do not amount to more than one in

a year, whereas the total deaths from all causes among such persons average about 30 yearly.

In only three autopsies out of 13 was a condition of lithosis stated to have been found, and in only one case was it fairly well marked. In two of the cases, tuberculosis was mentioned as present. In one case, the deceased was known to have been employed for some time in the South in working with freestone.

Occupational deaths from phthisis at ages under 21.—In dealing with occupational mortality I have, for reasons already stated, omitted deaths among persons under 21 years of age. It may be of interest to add a short note on these deaths.

Among engineers, blacksmiths, fitters, and similar workers, with about 650 youths at ages under 21 years, there was a total of 3 deaths from phthisis at these ages during the ten years 1900-9. Among joiners, cabinetmakers, shipwrights, etc., with about 700 youths under 21, the corresponding deaths numbered 5. Among stonecutters and masons, with about 600 persons under 21, the deaths were 6. The effects of stone dust are obviously not so great at these earlier ages as at later ages.

Among clerks, with about 750 persons under 21 years, there were 10 deaths. This represents a higher phthisis incidence than for the other occupations. It is of considerable interest to note that the whole of the 10 deaths took place during the first half of the ten years under review; and it is of almost more interest to find that during the second half of the ten years, the deaths above 21 years were, as compared with those for the first half, increased exactly by 10. In other words, each quinquennial period yielded, among clerks, the same crop of deaths from phthisis at all ages, but the age at death had become higher in the later period. The following is the number of deaths from phthisis for each year among clerks:—

	1900.	1901.	1902.	1903.	1904.	Total 1900- 1904.	1905.	1906.	1907.	1908.	1909.	Total 1905- 1909.
Above 21 years	4	5	4	1	4	18	3	6	8	4	7	28
Under 21 years	3	2	2	1	2	10	0	0	0	0	0	0
						28						28

The average age at death in 1900-4 was 27 years, while in 1905-9 it was 30 years.

Among combmakers, who also had a high mortality from phthisis among persons under 21 years, a somewhat similar transposition occurred. In each quinquennium there were 10 deaths from phthisis at all ages, but in 1900-4, 4 of the deaths were at ages under 21 years, while, in 1905-9, there was only 1 at these ages.

In other male occupations this transposition did not occur.

Among dressmakers and milliners, however, a change similar to that among clerks and combmakers took place, but it was accompanied by a large fall, during the second quinquennium, in the number of deaths at all ages. The figures are:—

	1900.	1901.	1902.	1903.	1904.	Total 1900- 1904.	1905.	1906.	1907.	1908.	1909.	Total 1905- 1909.
Above 21 years	7	7	2	4	1	21	1	5	3	3	1	13
Under 21 years	2	4	1	3	0	10	0	0	2	1	0	3
						31						16

Domestic servants showed practically no change in respect either of heightening of age at death or of diminution of deaths.

Reduction of excessive occupational mortality from phthisis.—As I have a strong conviction as to the important part played by constitutional susceptibility in the production of phthisis, I am of opinion that the entrance to all trades with a high mortality from phthisis should be guarded, as far as possible, against the admission of youths with a definite family history of tuberculosis, or with defective chest development, or with lung weakness. Each intending entrant should be examined by a medical man, and careful inquiry made into the health history of his family.

In addition, every reasonable and practicable method for diminishing the dangers attached to the trade should be enforced.

In the case of stonecutters, it would appear to be possible, as in certain other trades accompanied by injurious dust, to devise arrangements by which the dust might in large measure be drawn away from the faces of the workmen.

For clerks and tailors, who suffer chiefly from the sedentary nature of their occupation, the obvious remedy lies in spacious, well-ventilated and well-lighted offices and workrooms, with definite attention to outdoor exercise by way of recreation.

It is difficult to estimate the number of deaths from phthisis in each year in Aberdeen that are due to unfavourable conditions of occupation. Judged by the information before us, such deaths can scarcely be fewer than 15 to 20, or about 10 per cent. of the total deaths from phthisis.

Relation of occupational mortality from phthisis to mortality from tuberculosis among wives and children.—As bearing on the question of the infectiousness of phthisis, it is of interest to ascertain whether there is a high mortality from tuberculosis among the wives and families of persons belonging to an occupation with a high death-rate from phthisis.

It is difficult, for obvious reasons, to obtain precise information on this point, but I have extracted from the registers of deaths for the ten years, 1900-9, all the deaths from tuberculosis among the wives and widows and unmarried children (without definite occupation) of persons belonging to the occupations dealt with in the tables. It has to be admitted that the age constitution of the persons in any occupation will affect the possible number of wives and children exposed to infection, as also will the custom of the persons in regard to age at marriage. Clerks, for example, are largely composed of young persons, many of whom pass to other vocations after a few years. A considerable proportion of clerks remain unmarried, and those who marry, usually marry later in life than artisans and labourers. The proportion of wives to the total number of clerks is, therefore, small, as is also the proportion of children, and there are, therefore, fewer persons to be infected. On the other hand, almost all kinds of artisans and labourers marry early, and probably at about the same average age, and they have, accordingly, a fairly large proportion of wives and children. Printers and lithographers, for some reason, have, like clerks, a large proportion of young men.

In Table XII., two columns are supplied in which are given for each occupation the deaths from tuberculosis among (a) the wives and widows and (b) the unmarried children (without definite occupation) per 1,000 persons occupied (*i.e.*, husbands and fathers), above the age of 21 years.

It will be observed that, except for printers and clerks, the death-rate among wives and widows for each occupation has a comparatively limited range, namely from 1.6 to 2.1, although the death-rate from phthisis among the occupied persons

themselves varies widely from 1.1 to 5.7. Among children—again excepting those of clerks and printers—the variation is somewhat larger, namely from 2.7 to 5.5.

But, what is still more striking, the occupations with the highest mortality from phthisis are not, as a whole, accompanied by a high mortality from tuberculosis among wives and families. Stonecutters and masons, with the highest death-rate (5.7) from phthisis, and carters, with the lowest death-rate (1.1), have exactly the same death-rate from tuberculosis among their wives and children, namely 1.8 for wives and 4.7 for children. Both occupations are practically alike in regard to the proportion of occupied persons above 55 years of age (see Table XIII.). In both, elderly men find it a little difficult to obtain employment at their proper occupation.

Excluding clerks and printers, whose rates, for reasons already mentioned, unduly favour the suggestion that a high death-rate from phthisis among the occupied persons does not apparently increase the mortality from tuberculosis among wives and children, it will be found, on comparing the four occupations having the highest mortality from phthisis—viz., stonecutters, combmakers, tailors, and stonepolishers—with the four occupations having the lowest mortality—viz., carters, bakers, joiners, and engineers—that there is practically no difference in the mortality from tuberculosis among the wives and families, as is shown below:—

FOUR OCCUPATIONS WITH HIGH MORTALITY FROM PHTHISIS.

OCCUPIED PERSONS.				Deaths from Tuberculosis per 1,000 Occupied Persons.	
	Deaths from Phthisis per 1,000 Persons.	Average Age at Death from		Wives and Widows.	Unmarried Children.
		Phthisis.	All Causes.		
Stonecutters and Masons	5.7	43	51	1.8	4.7
Combmakers	4.3	47	57	2.0	3.2
Tailors	3.2	41	59	1.6	2.7
Stonepolishers and Sawyers	2.5	43	54	1.6	5.5
Averages	3.9	44	55	1.8	4.0

FOUR OCCUPATIONS WITH LOW MORTALITY FROM PHTHISIS.

Carters	1.1	38	54	1.8	4.7
Bakers	1.4	39	56	1.9	4.4
Joiners, etc.	1.8	36	60	1.8	3.7
Engineers, etc.	1.8	38	55	1.6	3.9
Averages	1.5	38	56	1.8	4.2

The conclusion to be drawn from this comparison may be considered to require some qualification in respect of the possibility that a high death-rate from phthisis for any occupation means a high proportion of early deaths of fathers, with curtailment of progeny, and, therefore, a smaller number of children exposed to infection.

This, however, has less influence than might be supposed; for as has already been observed, a high mortality from phthisis in any occupation, not exceptionally constituted in respect of age, is often accompanied by a high average age at death among those dying from phthisis. Thus, among the four occupations with the highest phthisis mortality, the average age at death from phthisis was 44; while among the four occupations with the lowest mortality it was 38 years. If it be assumed that the wife is of nearly equal age to the husband—and the difference is slight in occupations where early marriages are the rule—then, in those occupations with a high phthisis mortality, the wife has, on an average, practically reached the limit of the child-bearing age at the time of the death of her husband.

We would seem to be justified in deriving from the figures just considered some confirmation of the conclusion already drawn from a discussion of intermarital infection that, in the spread of tuberculous disease, or, at least, of fatal tuberculous disease, the presence of the seed is of less account than the character and condition of the soil.

It is desirable that similar investigations should be made elsewhere, especially in places with trades having a high mortality from phthisis. I may add that in a recent conversation with Dr. John S. Haldane, of Oxford University, a leading authority on occupational diseases, I learned, in mentioning to him the results of these inquiries in Aberdeen, that his investigations among Cornish miners had suggested the same conclusions, although he had not yet published them.

If I may avail myself of this opportunity of restating (see p. 82), with some additions and in clearer terms, the conclusions with regard to the infectivity and fatality of tuberculosis that appear to me to be warranted by our present knowledge and that are in agreement with my own observations, I would say:—

- (a) That judged by the investigations of certain credible pathologists and clinicians, almost every adult and a large proportion of children—a proportion that steadily increases with advancing age—have been infected at one time or other with tuberculosis, but mainly in a mild form; and that on this basis tuberculosis may be inferred to be highly—or, at least, widely—infectious.
- (b) That a serious or fatal issue from tuberculous infection is largely dependent on the degree of the vital resisting powers of the person attacked as influenced by an inborn or an acquired vulnerability, and that, consequently, although the person may have received his infection from a person suffering from a severe and fatal tuberculous illness, the character of the attack and the gravity of the issue in the freshly infected person are not determined by the character of the infecting case, but by the degree of his own resisting powers, and that in this sense—in respect of the transmissibility of dangerous infection—the infectivity of tuberculosis is low.
- (c) That in some cases the severity of the attack may depend on the virulency of the infecting material or on its amount, but the evidence from intermarital infection, where the amount of infection must be great, and from

the relation of occupational phthisis to the mortality from tuberculosis in the families of the phthisical workmen, would appear to indicate that the amount of the infective material, provided it is sufficient to infect, does not play an important part in influencing the gravity of the issue; and that in this respect tuberculosis does not differ essentially from other germ diseases.

- (d) That, fortunately, the resisting power of the human body to serious or fatal invasion by tubercle is capable of being greatly heightened by every condition and circumstance that make for the maintenance and improvement of health, even if the person attacked is handicapped by an inherited predisposition.
- (e) That so long as tuberculous infection is so widely spread, the most effective defence against serious individual invasion by it would, for the immediate future as for the recent past, appear to be the encouragement of every measure and movement, sanitary and social, that may improve health, and thereby increase the vital resistance.
- (f) That as, nevertheless, tuberculosis, as a germ disease, can spread only by infection, and as almost no one is born tuberculous, properly directed efforts, even if the results be not very apparent at first, should be made to limit the chances of infection, so as gradually to increase the small proportion of persons that at present escape, in the hope that by such efforts, and by those directed towards the improvement of the health of the community, a time may by and by be reached when the number of infection-producing persons (a number always considerably short of the number of merely infected persons) will become so reduced that a really effective control of the sources of infection can be established.

Fecundity in phthisical families.—The apparently exceptional fecundity in phthisical families is not infrequently remarked upon.

The number of children, alive and dead, was ascertained for each family investigated. Taking only completed families (that is, families in which there was obviously no prospect, from age of mother or otherwise, of further additions), and excluding illegitimates, whose parents had not subsequently married, it was found that the average number of children to each marriage was 7.4. This average was obtained from 213 completed families in which one or more members had died from phthisis. The parents themselves might or might not have suffered from phthisis, but one or both in the majority of cases were found to have a tuberculous family history. The families were all more or less grown up, and some were of middle age, so that the estimated fecundity belongs to a period when the birth-rate generally was higher than at present. The families, owing to the higher incidence of tuberculosis among the poor than among the rich, were chiefly working-class families, which are usually larger than the families of the richer classes.

Exact information is not available for the community generally as to the size of families. The census does not provide it; but from a comparison of births with marriages, I have calculated that the number of births to each marriage in Aberdeen was 4.4 in 1866-75 and 1876-85, and fell to 4.0 in 1886-95, and to 3.4 in 1899-1903. This includes sterile marriages which are believed to amount to 1 in 7 or 8 of all marriages. If sterile marriages are deducted, the births per marriage will be raised

to 5.0 and 4.6 for the periods 1866-85 and 1886-95, respectively. But even these numbers are considerably under the 7.4 found for phthysical families.

There is, therefore, some ground for the popular belief that phthysical families are unusually large, and that persons of a tuberculous strain are unusually prolific. This is somewhat unfortunate, as it tends to increase unduly the proportion of persons with a tuberculous predisposition; but it is probable that such tendency is checked by the excessive mortality in such families.

Some of the phthysical families were extraordinarily large. Out of the 213 completed families, regarding which information on this matter was collected, there were 1 with 19 births, 2 with 17 births in each family, 1 with 16, 3 with 15, 2 with 14, 3 with 13, 10 with 12, 10 with 11, and 24 with 10 births in each family. Thus, there were no fewer than 56—or fully one-fourth—of the families with 10 or more births in each, and with a total of 651 births.

Mortality and causes of death in phthysical families.—As regards the mortality in families with one or more deceased phthysical members, notes were obtained, as far as possible, of the number of deaths in the family and the cause of death, together with the age at death. Out of 246 families, with at least one other member besides the deceased, and excluding parents, there were 203 in which deaths had occurred previous to the death of the deceased—the total number of such deaths being 514, or an average of 2.1 per family for 246 families. There is no easy method of comparing this mortality with that in other families similarly composed in respect of numbers and ages. I am of opinion, however, that it is distinctly high.

Of the 514 deaths, in as many as 164 the cause was stated to be unknown. In 62 of these deaths from unknown causes, the death took place in infancy. From the description of the symptoms, the cause was probably tubercular in several cases. In the remainder of the 102 deaths from unknown causes, the age at death was, in the vast majority, between 15 and 40, and the description of the symptoms pointed to phthisis in a large proportion. There is often great reluctance among relatives in disclosing phthisis as a cause of death.

In 119 of the 350 deaths assigned to a definite cause, phthisis was stated as the disease. In 25 other deaths, other forms of tuberculosis were stated. Bronchitis accounted for 13 deaths; heart disease for 10; pneumonia for 12; whooping cough and measles, each for 16; cancer for 2; convulsions for 12; teething for 12; prematurity for 9; paralysis for 4; scarlet fever for 8; child-bed for 9; kidney disease for 3; debility for 5; and diphtheria for 4. No other cause was associated with more than 3 deaths, except accident, which accounted for 15 deaths.

Tuberculosis, therefore, greatly predominated as the cause of death in the families investigated, especially when there are added the deaths of the phthysical members who were the occasion of the inquiry.

Thus, in 203 families, there had been 717 deaths, of which 347 were definitely ascribed to tuberculosis, and to these may safely be added half of the deaths with unstated cause. This brings the total of tuberculous deaths to 429, or to 6 in every 10 of the deaths from all causes. In the population generally the tuberculous deaths are less than 1 in 10 of all deaths.

In some instances only a solitary member of the family had suffered from tuberculosis. In some other families tuberculosis had affected a large proportion of the members of a large family. For example, in one family of 17 children, 3 of whom

were, however, still-born, 7 were suffering or had died from tuberculosis; in another family of 12 members, 8 had died of phthisis, and a ninth was ill; in a family of 11 members, 7 were suffering or had died from tuberculosis; in a family of 13, 6 had died of phthisis; in a family of 10 members, 6 were suffering or had died from tuberculosis; and so on.

Relation of tuberculosis to order of birth in family.—It is sometimes stated that the older members of a family are more liable to suffer from phthisis than the younger members. It is not a question of any practical importance, but it has some scientific interest, and has in part been investigated by Karl Pearson.

In any community, if the general death-rate among persons of different order of birth has been the same for persons of each order, the proportion of eldest-borns must always be larger than the proportion of second-borns, and the proportion of second-borns must be larger than that of third-borns, and so on. This is due to the number of children in a family varying from one upwards. Accordingly, if the deaths from phthisis were evenly distributed among the persons of all orders, the largest absolute number of deaths would be among first-borns, and the lowest number would be among those of the lowest order.

Thus, among 240 persons dying from phthisis in Aberdeen (excluding persons of illegitimate birth), whose position in the family was ascertained, it was found that 59 were first-borns; 45, second-borns; 32, third-borns; 31, fourth-borns; 23 fifth-borns; 15, sixth-borns; 9, seventh-borns; 9, eighth-borns; 4, ninth-borns; and so on, the number decreasing with descent in order of birth.

If, however, only completed families are compared—that is, families in which there is no prospect of any more births—and if only such families among these are selected as are entirely grown up to the ages at which phthisis begins to prevail, I find that there is no evidence whatever of the order of birth having any effect on liability to phthisis.

I have also endeavoured to answer the same question in regard to other forms of tuberculosis, especially tuberculous meningitis. It is more difficult here to be certain of the results, as the investigation is one of considerable complexity, and the total number of cases investigated was necessarily small. The results, however, pointed to the same conclusion as for phthisis.

Birthplace of persons dying from phthisis.—This was ascertained, so far as possible, for all persons dying from phthisis in 1907 and 1908.

It was found that, of those with regard to whom information was obtainable, 62 per cent. of the males had been born in Aberdeen, 11 per cent. in other Scottish towns, chiefly small towns in the surrounding counties, and 25 per cent. in rural districts. Rather less than 2 per cent. were born outside Scotland. As regards the females, 55 per cent. had been born in Aberdeen, 12 per cent. in other Scottish towns, and 29 per cent. in rural districts. About 4 per cent. were born outside Scotland.

The parents of almost all the very large families, to which reference has been made, and in which several cases of tuberculosis occurred, had been born in rural districts or small villages.

The census returns, although giving information as to the birthplace of each person, do not distinguish between birthplaces within Scotland. It is, therefore,

impossible to say definitely whether the foregoing percentages indicate a higher ratio of phthisis among persons born outwith Aberdeen than among persons born within Aberdeen. I believe, however, that they do. The death-rate from phthisis in the surrounding small towns and rural districts is not, on the whole, higher than in Aberdeen. We must, therefore, conclude that country-bred persons and their families are more liable, when placed in towns, to suffer from fatal phthisis than town-bred persons.

M. H.





CITY OF ABERDEEN.

REPORT

BY THE

MEDICAL OFFICER OF HEALTH

(MATTHEW HAY, M.D., LL.D.)

FOR THE YEAR

1909.

With Appendix on Tuberculosis in Aberdeen.

